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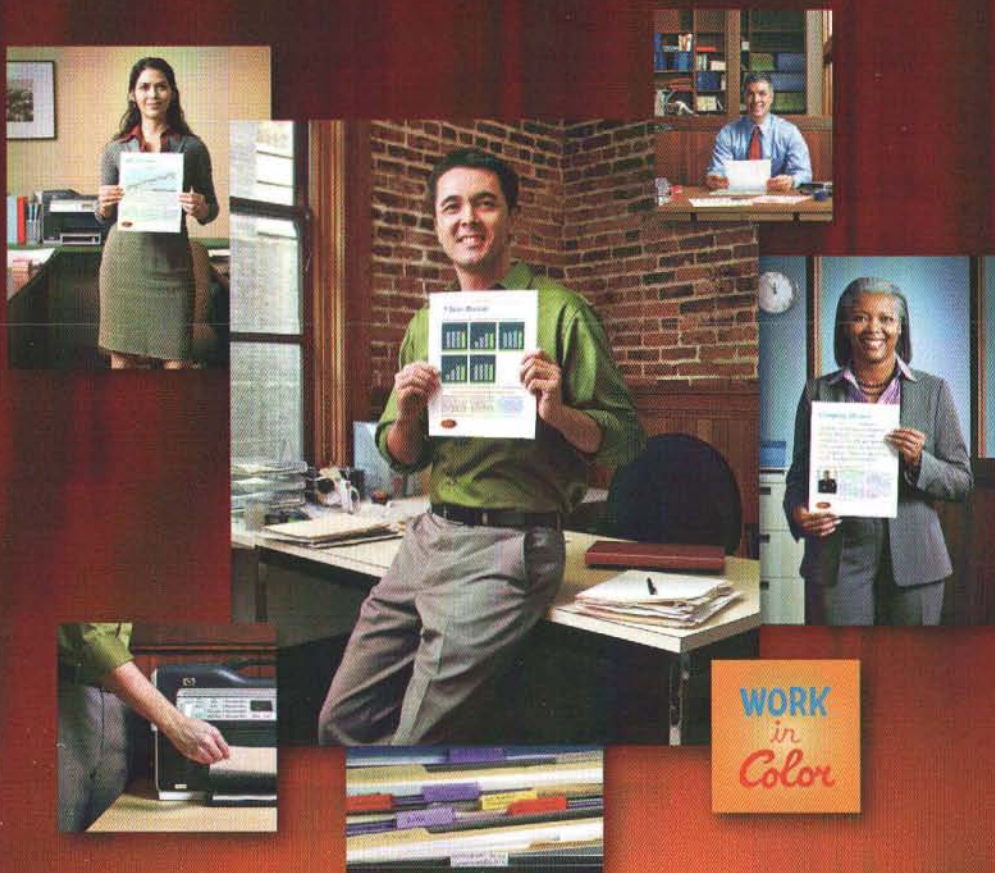
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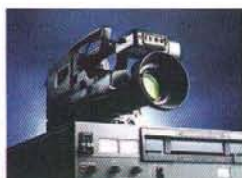
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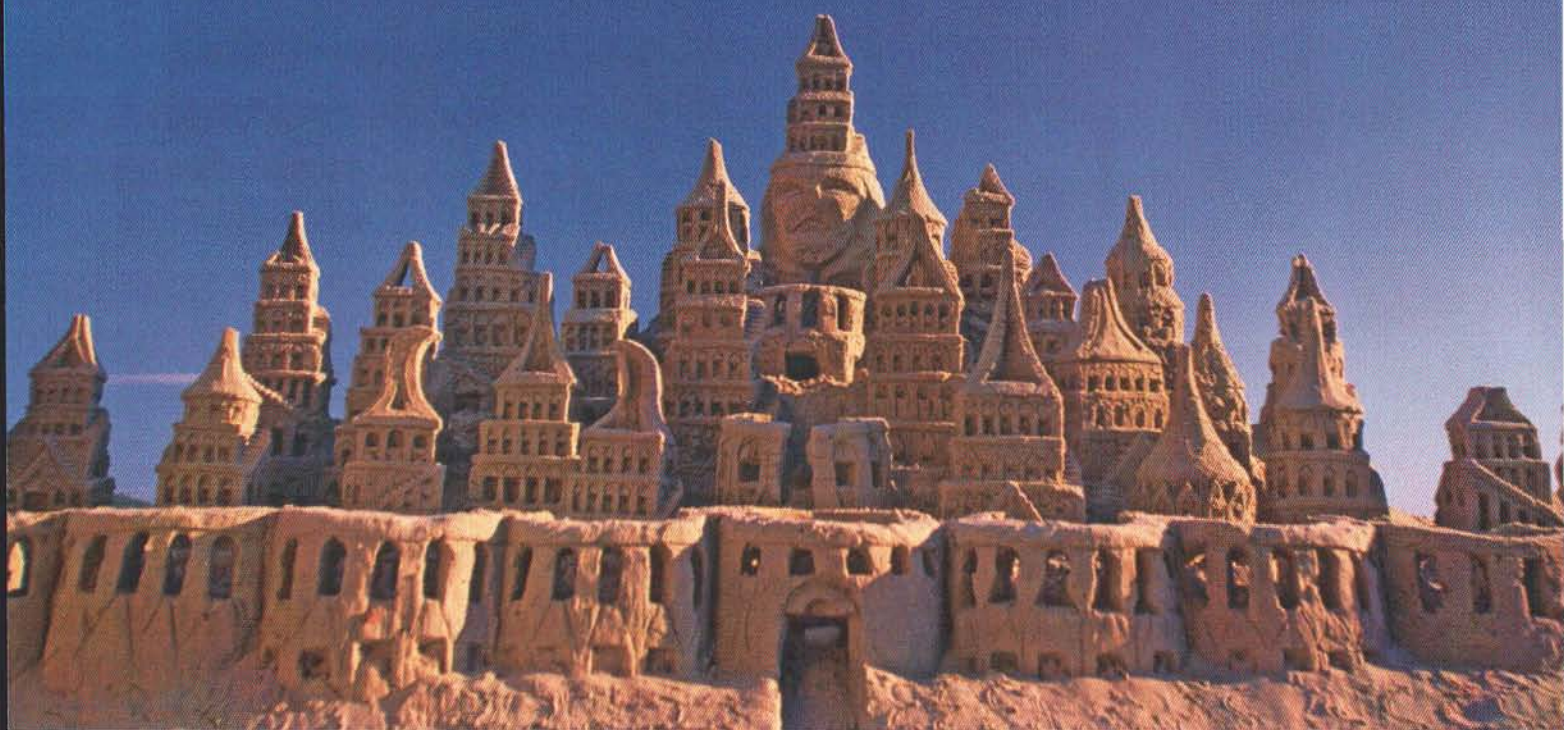
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From the Editor

The transition to Intel processors has been nothing short of amazing. Many of us had one or more fears about how smoothly it would go, but those have been largely unfounded. It has opened up many, many new opportunities and allowed software and hardware to run with OS X that wasn't available or even possible prior. Interestingly, this has provided many Mac users their first experience with Windows. So, while the Mac itself gains popularity, it's also helping expose more people to Windows. Parallels and VMWare have been the prime movers in this arena. MacTech has had to keep pace, running articles on virtualization, integration with Windows and learning the ins and outs of multiple operating systems.

This month, author **Joe Froelich** points out a major difference that currently exists between OS X and Windows: OS activation. Windows requires a product key to run the product past 30 days. Well, this is something you must now manage! This becomes compounded for anyone responsible for other people's Windows deployments, virtualized or otherwise. Follow Joe's advice in, "**The Mac Consultant's Guide to Managing Windows Product Keys.**"

Our cover story this month covers one of the earliest ways that disparate systems have been able to keep communication open: ftp. Despite challengers, it's still alive and well. Sometimes, it's this lowest-common-denominator factor that makes it the right solution, particularly in closed LAN or WAN environments. **Mary Norbury** rounds up everything you need to know about current **FTP Clients for Mac OS X.**

Dave Dribin brings aspiring developers another crystal clear introduction to some foundational programmer topics. This month's **Road to Code** delves into memory topics as an expansion to last month's intro to pointers.

Speaking of programming, **Aaron Hillegass** runs The Big Nerd Ranch and it's associated courses. If you've ever been tempted to take a course there, particularly "**Cocoa Boot Camp**," read **Kok-Yong Tan's** first-hand experience in Atlanta. Sounds very non-nerdy, and like a great place to focus on the topic at hand.

Philip Rinehart from **MacEnterprise** talks about a topic that can't be talked about enough: proper way to deal with quotes when in a shell. Please, for the children, read, "**Quoting in the Shell.**"

This month, the MacTech Spotlight swings around and shines on independent developer **Brian Webster**. I met Brian at WWDC this year, and didn't immediately recognize his company, **Fat Cat Software**, as the developer of the very useful **PlistEdit Pro**. For more on what got Brian going, and what he has planned next, read the rest of his profile in this month's **MacTech Spotlight.**

Edward Marczak,
Executive Editor



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MAC IN THE SHELL

by Edward Marczak

More ftp

I've got a fever,
and the only prescription
is more ftp

Introduction

ftp – whether we're referring to the actual protocol, or just file transfer in general – is something we all need on some basis. When I started toying with computers, I saw punch cards, but never really *had* to deal with them. But that was only one method of file (or more generally, *data*) transfer. Then we moved up to tape and floppy disk. Now, very few computers are not connected to a network of some type, and the primary reason is to transfer data in the form of files. Our cover story this month touches on several GUI-based clients, but when you read this column, those utilities get the “Mac In The Shell” treatment. We need to be able to transfer files easily from a shell!

Why?

I often create automated solutions that run on a server without a GUI. There are also plenty of times when a simple, repeated file transfer shouldn't pop up anything visually on a client machine, either. It should ‘just happen’ simply and reliably with no pomp and circumstance. Enter **curl**, **ftp** and **wget**.

Of the three, “ftp” is the oldest and most simple. **wget** brings further power, and **curl** is a veritable Swiss Army Knife of transfer agents. If one of these options can't do what you want, it's most likely not possible (or, consider a different tactic!).

ftp

ftp, the application, implements a client side version of the ftp protocol (which is detailed by Mary Norbury in this month's cover story, “FTP Clients for Mac OS X”). In simple use, you can use it interactively:

```
$ ftp ftp.example.com
Trying ftp.example.com...
```

```
Connected to ftp.example.com.
220 example.com FTP server ready.
Name (ftp.example.com:marczak):
331 Password required for marczak.
Password:
230 User marczak logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd Public
250 CWD command successful.
ftp> ls
229 Entering Extended Passive Mode (|||50077|)
150 Opening ASCII mode data connection for '/bin/ls'.
total 1
-rw-r--r--  1 marczak  marczak      0 Nov 16  2006
.localized
drwx-wx-wx  3 marczak  marczak    102 Nov 16  2006 Drop Box
-rw-r--r--  1 marczak  marczak  43796 Jul 20 07:14 test.jpg
226 Transfer complete.
ftp> bin
200 Type set to I.
ftp> get test.jpg
local: test.jpg remote: test.jpg
229 Entering Extended Passive Mode (|||50079|)
150 Opening BINARY mode data connection for 'test.jpg'
(43796 bytes).
100% |*****| 43796    121.76 MB/s   00:00
226 Transfer complete.
43796 bytes received in 00:00 (21.79 MB/s)
ftp> quit
```

Any techy person over the age of 25 should recognize this immediately. They should also remember in the days before big-business-on-the-Internet that it was polite to wait until “after hours” before using ftp against a University server! In the annals of tech-history, though, one needed to be familiar with transferring files this way.

The shell-based **ftp** application has a good lexicon in its interpreter. It's one that has grown substantially since its inception. However, for purposes of automation, that can get clumsy. You *could* script it with **expect**. Some versions of ftp allow creating a script and having ftp simply run through the motions that the script indicates. However, the version of ftp that ships with OS X (at least in Tiger) omits this option. It does keep the macro definition option in, though.

Never fear! The parameters available to you are greatly expanded, including passing a user name and password along. This is ideal for scripting *within your own scripting environment*. So, if I know in advance the names of the files I need to transfer, I could script this in bash thusly:

```
ftp -V
ftp://user:password@server.example.com/directory/file.txt
```

...which will download file.txt and name the local file “file.txt”. Note the -V switch, which is the opposite of -v – keeping the output quiet. I can also go the other way using:

```
ftp -V -u ftp://user:password@server.example.com/directory/
file.txt file2.txt
```


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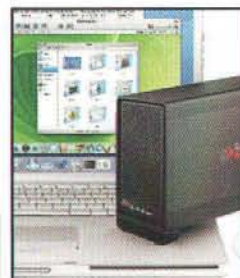
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...which will *upload* the specified file(s) – in this case, file.txt and file2.txt – to the given directory. Don't forget the trailing slash on the target directory!

Don't miss the fact that any valid URL syntax will work, so, you can 'ftp' a file from an HTTP server, too:

```
$ ftp http://www.example.com/directory/cars.jpg
Requesting http://www.example.com/directory/cars.jpg
17746      29.87 KB/s
```

So, good 'ol **ftp** provides us with some quick and easy ways to move files around. Not ideal ways, perhaps, as not only is our password sent in the clear as part of the ftp protocol (which may not be an issue for you), but also displays our password in a process listing. That's not really cool.

ftp does offer many more options, so, check the man page if you need to get in deeper.

wget

wget bills itself as the "non-interactive network downloader." So, unlike **ftp**, there is no interactive mode with which you can use to generally poke around. However, we're here to talk about automated use, so, we don't need no stinkin interactive mode! If you were desperate, though, you could use one of **wget**'s more interesting features: when an ftp directory is requested, it will automatically convert the output into an html listing. That might be a little too esoteric...even for me!

Disappointingly, **wget** is not installed by default under OS X Tiger. However, it's simple to install one way or another. You can grab the source from the GNU page at

<http://ftp.gnu.org/pub/gnu/wget/> and compile it yourself. Quentin Stafford-Fraser has a pre-compiled binary here: <http://www.statusq.org/images/wget.zip>. Finally, you can install **wget** using fink or MacPorts.

To get right down to it, like **ftp**, you can use any rational URL to specify your target:

```
$ wget
ftp://emarczak:sekretpass@ftp.example.com/path/Big_File.zip
--07:23:08--
ftp://emarczak:*password*@ftp.example.com/path/Big_File.zip
=> 'Big_File.zip'
Resolving ftp.example.com... 192.168.77.201
Connecting to ftp.example.com|192.168.77.201|:21...
connected.
Logging in as emarczak ... Logged in!
==> SYST ... done.      ==> PWD ... done.
==> TYPE I ... done.    ==> CWD /path ... done.
==> PASV ... done.      ==> RETR Big_File.zip ... done.
Length: 10,871,922 (10M) (unauthoritative)

100%[=====>] 10,871,922  638.53K/s  ETA
00:00

07:23:27 (601.74 KB/s) - 'Big_File.zip' saved [10871922]
```

Also like **ftp**, **wget** will display your password in a process listing, so, use this with care! Here's where the roads diverge, though, and **wget** has a few more tricks up its sleeve. You can recursively download an entire ftp or http directory with the "-r" switch:

```
wget -r -t 5 ftp://emarczak:sekretpass@ftp.example.com/path/
```

I also threw in the "-t" switch, which will allow for multiple retries if some part of a file download fails. "-t" also allows for



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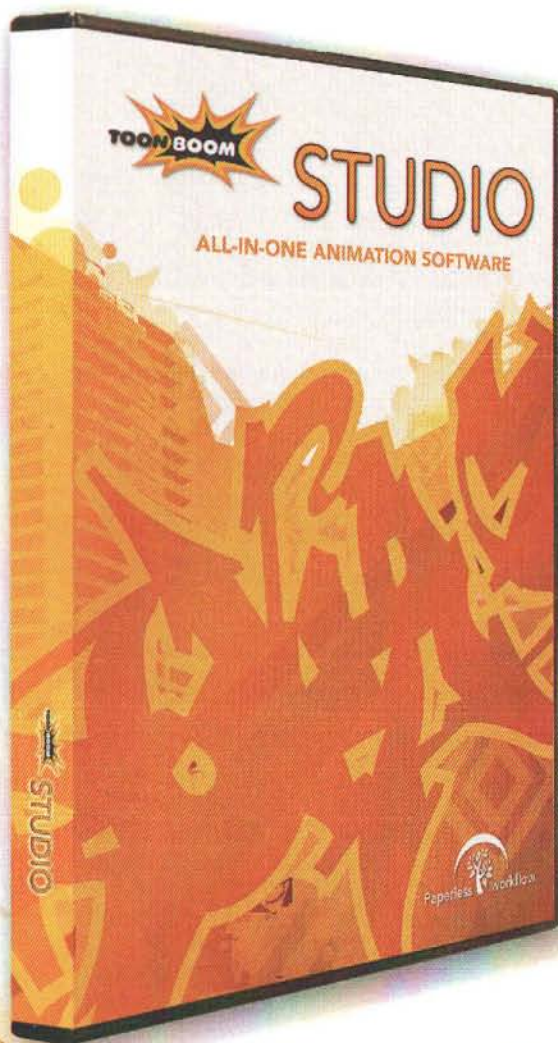
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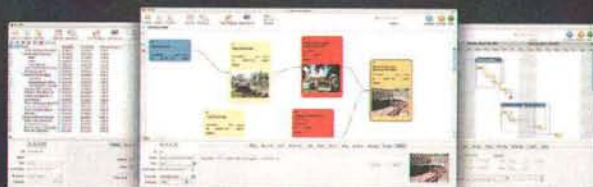


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a value of "inf" causing infinite retries. Also useful here is the "-l" (ell) switch, which limits the depth of the traversal. So, to grab just the items from the top layer of the directory you specify, use "-l1".

An absolute life saver is the "-c" switch: it tells wget to *continue* a partial download. So, if your download bombs, or, perhaps you're on a laptop and need to run before the transfer is complete, retry the operation with the "-c" switch and pick up right from where you left off. Nice.

Wget will read a list of URLs from a file, using the "-i" switch. This is handy for scripting, of course. However, it's also a very nice way to keep your password out of a process listing. With your username and password embedded in a file, you're not using it on the command line. This list also comes in handy as a way to store your favorite sites and then recursively them locally using the "-r" switch mentioned above. In fact, toss in the "-A" switch, which will only *accept* certain files, and you can download only files of a certain type from a site. Next time you want all of the mov files from a given site, try this:

```
wget -r -l4 http://www.example.com/movies -A.mov -np
```

This will mirror the given site, and only transfer files ending in ".mov" on the given pages up to 4 levels deep. We also ensure that we don't follow links back up to the parent directory ("-np", or, "--no-parent").

Again, wget has many, many tricks up its sleeve. Too many to list here, but the brief introduction should convince you of its utility above the standard "ftp" application. Check out the man page for much more. (Specifically, check out the "-k" switch!).

curl

Like the other utilities mentioned here, curl will accept any valid URL as its file description. Unlike wget, curl *is* installed as a part of OS X. One very cool curl trick is that it dumps files to standard out unless it's told where to write them. Why is that cool?

Sometimes, you just want to view a remote document, be it an actual file – like a README or index.html file – or a directory listing. So, you could easily:

```
curl  
http://server2.example.com/instructions/how_to_do_it.txt |  
less
```

...which will get the file from the server and pipe it into less. When you quit less, there will be no file remaining to clutter up your disk. I sometimes use that with <http://www.whatismyip.com>, and then pipe the output to a script that simply reports back the machine's external IP address. This is also a cool way to run a remote script:

```
curl ftp://server.example.local/script.sh | bash
```

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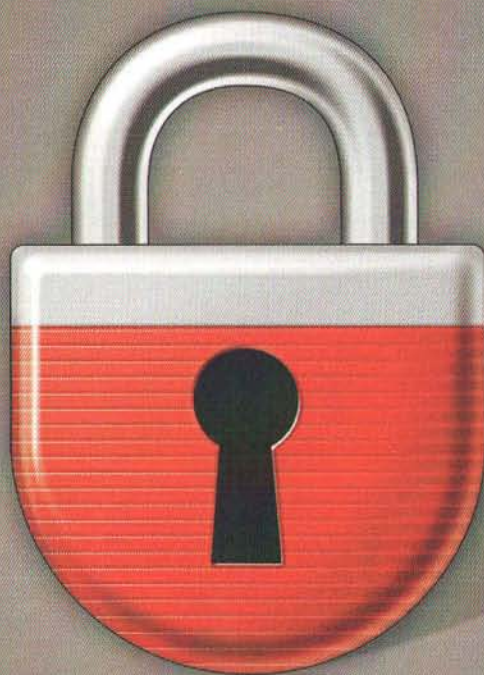
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If you are interested in downloading a file, use the “-O” switch (capital O), which names the local file the same as the remote:

```
curl -O ftp://ftp.example.com/path/to/file/some_file.zip
```

This will anonymously download `some_file.zip`, and store it in the current working directory as `some_file.zip`. I also particularly like the “-L” switch (capital ell) when used with http servers as this will make curl follow http redirects.

Of course, curl will upload files, too. The “-T” switch will take care of this for you:

```
curl -T "pix[1-100].jpg" ftp://ftp.example.com/pictures/
```

I also threw in the fact that curl will respect globbing and regular expressions. So, the previous example will upload `pix1.jpg`, `pix2.jpg`...up through `pix100.jpg`. Clearly very handy.

Both upload and download can be resumed using the “-C -” switch (capital C followed by a hyphen). The hyphen tells curl to figure out where to resume from automatically. This does require server-side support in the form of telling the server at which byte to start appending at (the `SIZE` command for upload) or which byte to start the transfer from (ftp resume or HTTP 1.1 for downloads).

If you're an all-OS X shop, you'll be happy to hear that curl supports Kerberos. You can get your initial ticket the usual way (kinit), and then tell curl to use that authentication via the “--krb” switch.

```
curl --krb private ftp://krb4site.com -u username:boguspw
```

If this uses Kerberos, why did I *still* supply a name and password? This is a bit of a hack, but with no password, curl will still want to prompt you for one. However, if you supply one, but use Kerberos, it'll just ignore the password you supply – so use a bogus password as this will appear in process listings.

Conclusion

Being able to script data transfer is an important part of every system administrator's toolkit. While good 'old ftp will do the job in many cases, wget and curl give you much more flexibility. Both utilities have overlap in functionality, but curl goes deeper in many cases. Case in point: when I said that curl accepts any valid URL syntax, try `TELNET://`, `dict://` and even `LDAP://` (although, you'll currently need to build your own curl for LDAP support as the Apple supplied version isn't linked correctly with the LDAP framework).

Of course, there are other file transfer options available to you, including scp, sftp, ditto and rsync, to name a few. However, I focused mainly on ftp options here, as ftp is alive and well, but sometimes overlooked. While perhaps a deceiving name, sftp is not true ftp, but file transfer over ssh, requiring no ftp server at all. Of course, over “hostile” networks, you should use no less than an encrypted solution. However, with the right internal setup, and in certain other cases, ftp can be the perfect solution.

Media of the month: the ftp RFC: <http://www.faqs.org/rfcs/rfc959.html>. If you want to get deeper into ftp and understand why it behaves the way it does, this RFC is the way to go.

Please practice this in a test environment and then press it into real-world use where appropriate. Until next month, I think you'll find this a great tool in your automation arsenal.

MM

About The Author



Ed Marczak owns and operates Radiotope, a technology consulting company that guides companies to use what they have as efficiently as possible. He is also the Executive Editor of MacTech Magazine, a husband and father of two. His spare time is spent editing MacTech Magazine and enjoying his family. He finds keeping it all running smoothly good practice. Improve your practice at

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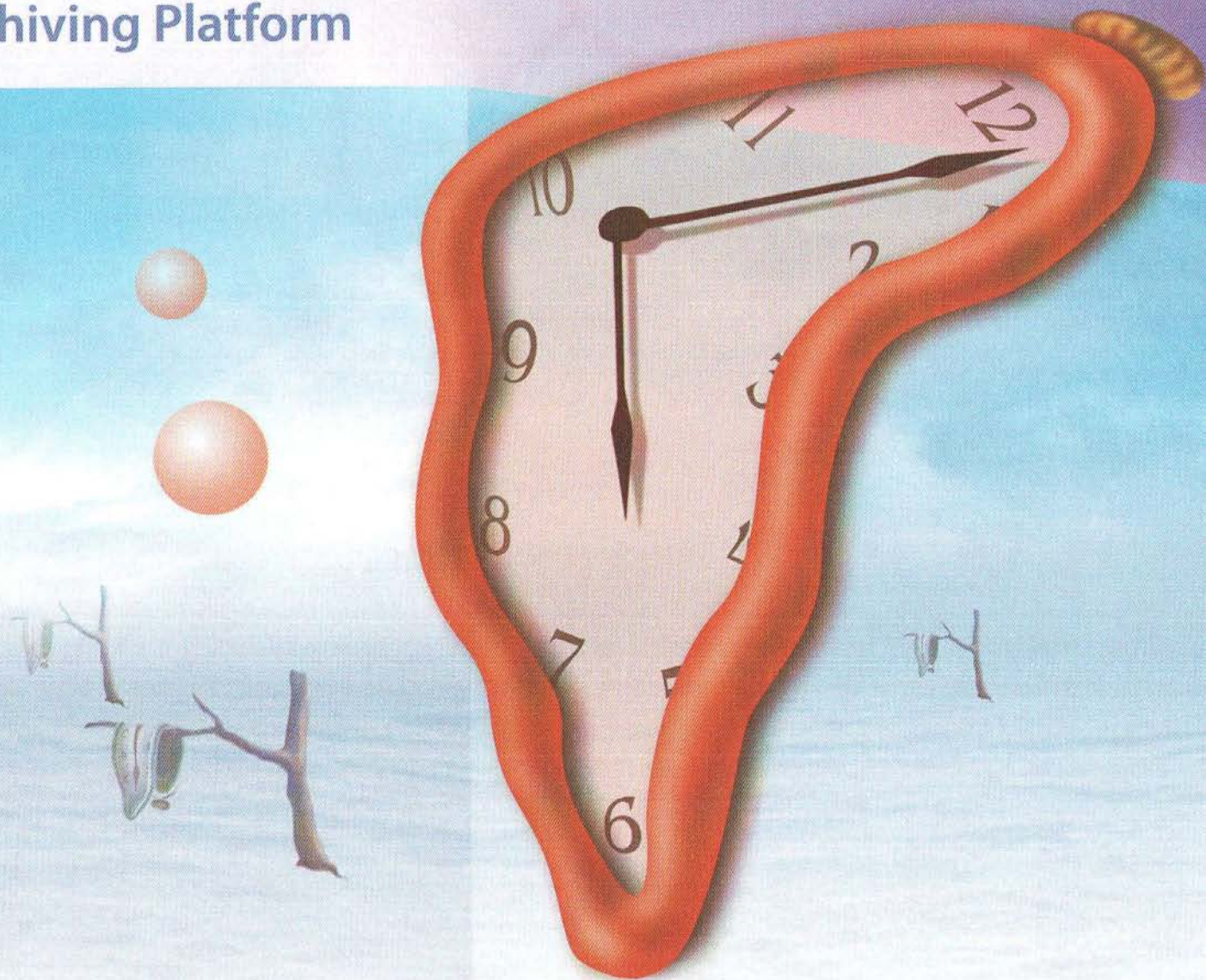
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Protect. Archive. Restore.

The Mac Consultant's Guide To Managing Windows Product Keys

Do your customers (and yourself) a favor
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by Joe Froehlich

It's all in your mind

In spite of an ever increasing need to live, work, and play in a cross platform environment, the rift between PC and Mac users often appears to be widening rather than narrowing. Mac users cherish the simplicity of the Mac while PC users seem to almost relish complexity. After all, if a computer isn't difficult to use and maintain, it can't possibly be a serious business tool, right?

Having switched primary platforms several times over the course of my career, I've learned one important lesson—people don't like change, especially when it threatens their comfort zone. To survive a change successfully, you need to “adjust” your mindset. Typically, this means learning (and ultimately accepting) new and different ways of approaching things.

Sleeping with the enemy

With the advent of virtualization products such as Parallels Desktop and VMware Fusion, consultants and support professionals alike are facing new challenges. The key to turning these challenges into opportunities lies in learning how to respond appropriately to client requirements (without saying “Ugh, it's Windows” to yourself). In this article, I'll provide some best practices for getting started with supporting Mac users who want to run Windows, regardless of whether it's on a physical or a virtual machine.

Get with the program

One of the best ways to bring yourself up to speed on Windows-related technology is to get your hands on the actual operating systems and applications you'll be supporting.



Figure 1: Microsoft Partner Program at <http://partner.microsoft.com>

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Servoy specializes in efficient, fast SQL code when talking to your SQL sources. The free Servoy Application Server has built-in connection pooling, performance history, and supports inner and outer SQL joins.

In a nutshell - Servoy was designed to work with SQL sources in the most efficient, flexible and seamless way. FileMaker 9 has added to the types of external files that you can connect to - but you can't touch, view, optimize or customize the SQL they generate.

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Fortunately, Microsoft provides two specific programs that you should consider joining, depending on your objective.

Microsoft Partner Program

The Microsoft Partner Program, shown in Figure 1, consists of three distinct membership levels:

- Registered
- Certified
- Gold Certified

The Registered level is free (after a one-time registration process) and best-suited for people who support clients in single-office home-office (SOHO) or small and medium-sized business (SMB) environments. The Certified and Gold Certified levels require a substantial annual fee and proof of certain technical and business competencies. You can find a comparative summary of program benefits at <https://partner.microsoft.com/US/program/programoverview>.

Once you sign up for the Registered Microsoft Partner Program, you're eligible to purchase the Microsoft Action Pack Subscription. This subscription includes quarterly mailings that provide technical and business resources appropriate for consultants and value-added resellers (VARs). It also includes a comprehensive collection of Not-For-Resale (NFR) software for the major Microsoft operating systems and applications. While licensing varies somewhat across titles, in general, you'll receive license keys that allow 10 client activations and 1 server activation per title.

Microsoft TechNet

Whereas the Microsoft Partner Program is designed for consultants and VARs, the Microsoft TechNet program, shown in Figure 2, is geared more toward technical support

professionals in enterprise environments. There are simply too many program benefits to describe fully in this article, but they include items such as planning and deployment tools, complimentary professional support incidents, managed newsgroups, virtual labs, and e-learning courses. And finally, TechNet subscribers receive a free subscription to TechNet Magazine, a hands-on monthly publication containing articles written by Microsoft's engineering team.

Arguably, one of the most compelling benefits Microsoft TechNet offers is access to full-version commercial products (without time limits or feature limits), including all Windows operating systems, all application software, and all server products. Again, licensing varies somewhat across titles, but most license keys are valid for 10 activations.

TechNet subscriptions are available under three different distribution schemes:

- Direct (download only)
- Single User (single workstation install)
- Server User (single server install)

For a detailed comparison of these subscriptions, point your web browser to <http://technet.microsoft.com/en-us/subscriptions/>.

You have the tools, now what?

Aside from the value of the business and technical information you receive as part of the Partner and the TechNet programs, your real learning starts with installing and configuring the software you acquire through these programs. Before you launch your first Setup Utility, however, you need to think about how you're going to manage your license keys. While 10 activations may seem like a lot at first, you can easily

expend them, especially if you need to do frequent re-installations or configure the software differently for specific projects.

For example, as a technical documentation developer, I often need to set up different software environments so I can take screen captures describing the tasks I'm writing about. Similarly, as a consultant or support professional, you may need to set up environments that mimic those of your clients. Or, you may simply need to test applications running in unique operating system environments. In any event, the point of thinking about license activation in advance is to make sure you

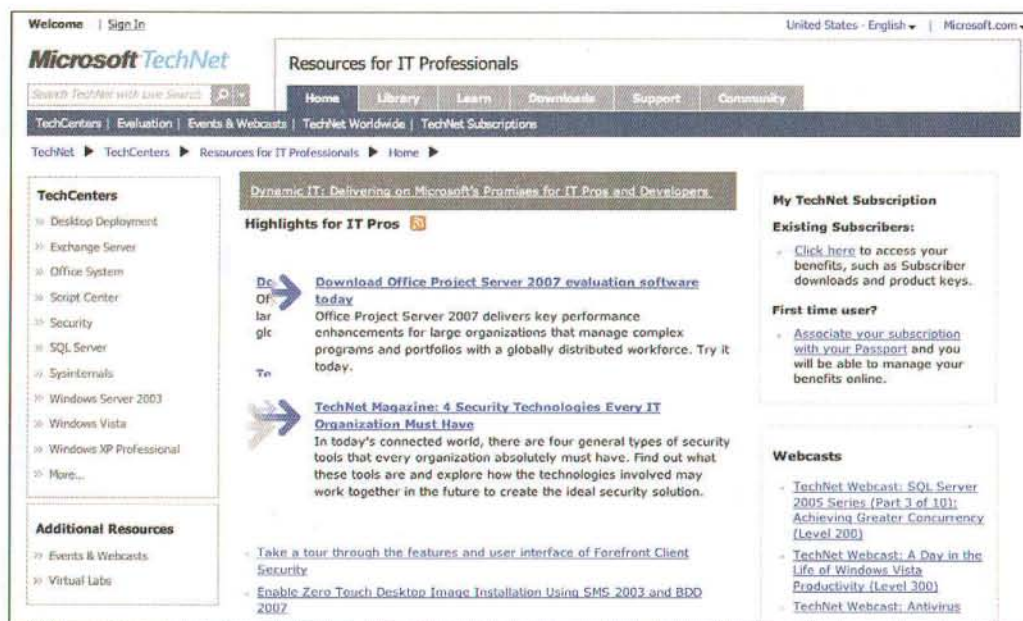


Figure 2: Microsoft TechNet at <http://technet.microsoft.com>

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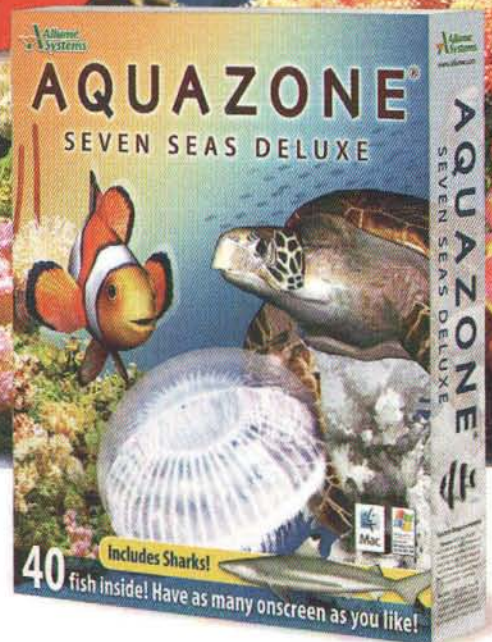


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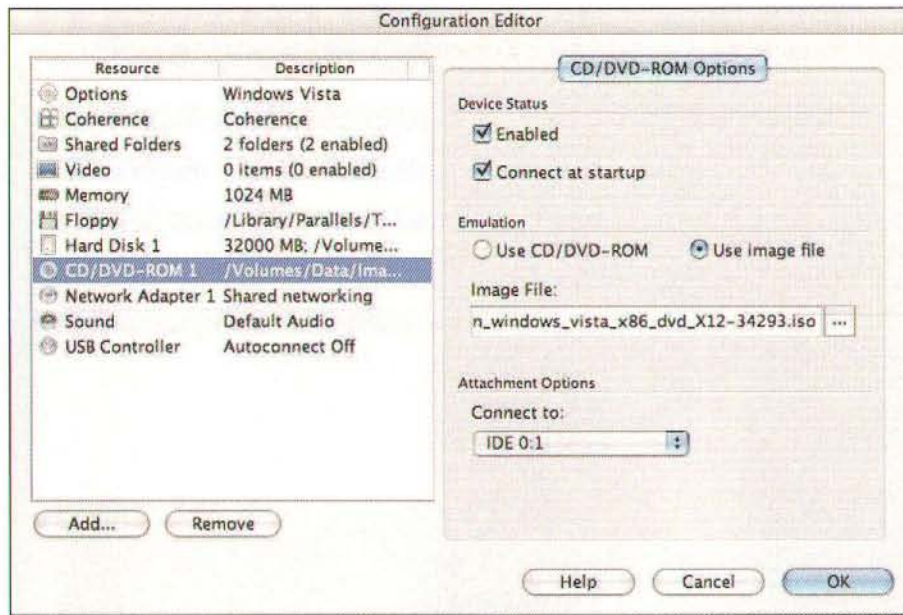


Figure 3: The Configuration Editor in Parallels Desktop

use your license keys wisely without activating them unnecessarily.

Remember my introductory comments about mindsets? You're working with Windows here not Mac OS X—you can't

just nuke and repave at will (at least not without requesting a reactivation key from the mothership). In the upcoming sections, I'll provide some best practices that have worked well for me over the years. I believe they'll serve you well, too.

We're going virtual, baby!

Thanks to virtualization software, you can install and configure operating systems and applications to your heart's content—all without needlessly wasting licenses. However, when you create a virtual machine, don't think of it as the machine you'll use for everyday tasks. Instead, think of it as a master (a pristine configuration) that you can clone for specific tasks as needed. The guidelines presented next work well for client installations you support as well as project-based scenarios.

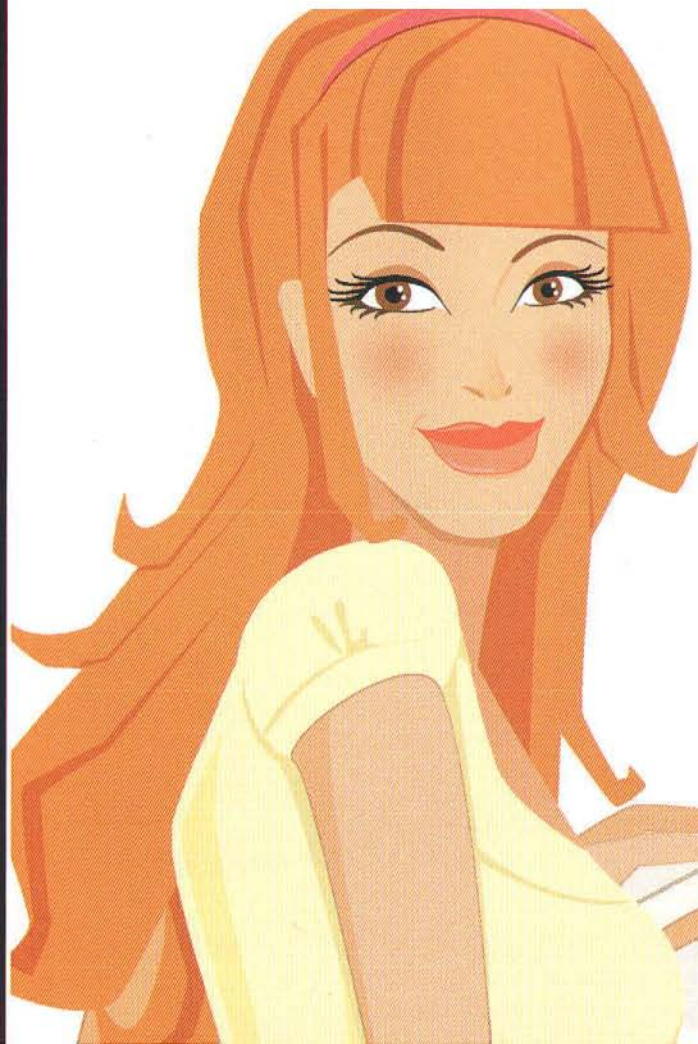
Create the virtual machine manually

Whenever possible, avoid using the installation assistants that VMware Fusion and Parallels Desktop offer. Instead, create

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the machine manually, as doing so gives you more control over its initial configuration.

Tweak the virtual hardware

Before booting the virtual machine, edit its configuration to tweak the virtual hardware as desired. For example, I like to point the virtual CD/DVD to an ISO image of the installation media, as shown in Figure 3. I usually keep that image in the same folder as the virtual machine. This way, I don't have to go looking for the CD/DVD if I need to install additional operating system components.

Perform a basic installation

Boot from the installation media (physical disc or ISO image) and follow the Setup Utility's prompts to complete a basic installation. In doing so, however, avoid as much customization as possible. You'll want to customize the clones (later) not the master machine.

Install critical updates

After the Windows operating system is installed and the virtual machine boots from it the first time, run Windows Update services to download and install only critical updates. Always reserve recommended updates for clones of the virtual machine.

Scrutinize your work

Take a break and ask yourself if the virtual machine is in a state that you want to use as the basis for cloning? Depending on the software title and its license, you have either 30 or 60 days to activate it. Depending on the project you're working on, you may not need to activate the license key at all because it's a short-term scenario.

Activate the product

Your master virtual machine isn't ready for cloning until you complete the Windows Genuine Advantage verification. However, you can't do that until after you've activated the product. So, when you're ready to proceed (you're certain, right?), activate the product, run Windows Update again, and complete the Windows Genuine Advantage verification process.

Back it up, then clone it

At this point, restart the virtual machine one last time (to make sure it starts up without problems), and then shut it down completely. Now, back up the entire folder containing the virtual machine (minus the installation ISO if you have one in the same folder). Then, to clone the machine, simply duplicate its folder. Before launching the clone, however, you may need to modify your virtualization application's preferences so it knows you want to work with the clone rather than the master.

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Just one more thing

I generally like to create at least two virtual machine masters: one with just the base operating system, and one with the operating system plus my primary applications (MS Office, for example). I first activate the operating system, as described above. I then clone the virtual machine and install my applications. I activate the applications, and then clone the virtual machine a second time. This technique allows me to revert to a clean installation of just the operating system, or the operating system plus my applications.

Let's get physical

You can use a similar process to protect your licenses on physical machines, including those hosting Apple's Boot Camp. Of course, you'll need a different toolset for that task.

To clone a physical installation, you need to be able to image the PC's boot drive—both the boot sector and the primary boot partition. One of the tools I've found useful for this job is Acronis True Image Home, shown in Figure 4. This product allows you to create a bootable CD/DVD that contains both hard disk and network drivers so you can generate a full image backup of the boot drive, store the image on the appropriate backup device, and restore it when needed.

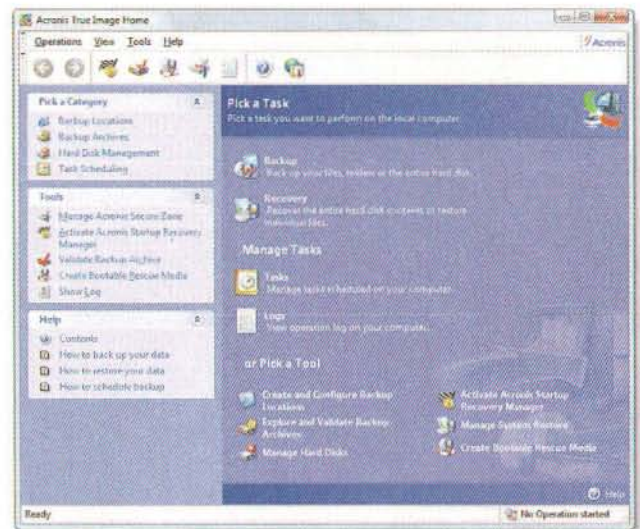


Figure 4: Acronis True Image Home

In this scenario, you can take the same general approach described earlier, i.e. do a clean installation without any customization, install critical updates, activate the operating system, and go through the Windows Genuine Advantage verification. Next, install Acronis True Image Home, create your boot rescue media, and then image the boot drive. If you need to reinstall the operating system, simply boot the machine from the rescue media, and then restore the image.

Conclusion

Having a practical method for protecting Windows license keys make sense for both you and your clients. While we focused on you in this article, there's no reason you can't implement the same practices at client sites. After all, they need to protect their keys as well.

MM

About The Author

Joe has extensive experience in the IT industry, serving as a technical trainer and instructional designer as well as personally authoring several IT certification titles. He's a member of the Microsoft Partner Program, the Apple Consultants Network, the IEEE Computer Society and holds several industry certifications (A+, Network+, i-Net+, Security+, CNA, MCP, ACHDS, ACTC). You can reach him at froejoe@gmail.com.

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THE ROAD TO CODE

by Dave Dribin

Bits and Bytes and Everything Nice

More Memory Topics

Memory

Last month in *The Road to Code*, we went over control statements, such as loops and conditional statements, as well as pointers. This month, we will be going over arrays and dynamic memory. Dynamic memory is used heavily in Objective-C, but I think the concepts are better demonstrated with straight C.

Arrays

A topic that goes hand in hand with pointers is arrays. Arrays are a collection of items of the same type. For example, let's say we want to keep track of the first three even numbers. We could use three separate variables, but that's a little tedious. Fortunately, there's another option. We can use an array, which is a single variable that holds multiple values. For example, see Listing 1.

Listing 1: main.c Simple arrays

```
#include <stdio.h>

int main(int argc, const char * argv[])
{
    int evens[3];

    evens[0] = 2;
    evens[1] = 4;
    evens[2] = 6;

    printf("evens[0] = %d\n", evens[0]);
    printf("evens[1] = %d\n", evens[1]);
    printf("evens[2] = %d\n", evens[2]);

    return 0;
}
```

When this program is run, you should get the following output:

```
evens[0] = 2
evens[1] = 4
evens[2] = 6
```

Digging into this example, the first odd thing you'll notice is the declaration of the `evens` variable. It starts off like other variable declarations with a type and a name, but after the name you'll see the square brackets with the number three in it: `[3]`. The square brackets tell the compiler that we are declaring an array of integers, instead of a single integer, and the number inside the brackets is how many items the array may hold. So, in this case, `evens` is an array that may hold three integers.

The second odd thing is how we are getting and setting the values of the array. Again, we use the square brackets to tell the compiler which item in the array we want to access. The number between the brackets is called an *array index*. This brings us to the first important bit of information: the first item in the array has an index of 0. Thus, the second item has an index of 1, and the last item has an index of 2. Even though this array has three items, the index ranges from 0 to 2. In fact, the last index of any array is the number of items minus one. It is important to remember this because the C compiler will not remind you. It will happily allow you to access index 3 of a three-item array. This kind of bug is very serious, and causes all sorts of trouble. So always be sure to double-check your array indexes!

The nice thing about arrays is that you can make them bigger to hold more items very easily. If we wanted to hold the first five even numbers, we just need to make our array bigger. In order to reduce code repetition, we can use for loops to initialize and print out the array:

Listing 2 main.c Using for loops with an array

```
#include <stdio.h>

int main(int argc, const char * argv[])
{
    int evens[5];
    int i;

    for (i = 0; i < 5; i++)
        evens[i] = (i+1) * 2;

    for (i = 0; i < 5; i++)
        printf("evens[%d] = %d\n", i, evens[i]);

    return 0;
}
```

This example shows that array indexes may be a variable, instead of a constant number. We are using the variable `i` to loop over all the indexes of the array. Note the condition of the for loop: `i < 5`. Using a less than operator ensures `i`



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loops from 0 to 4. This code is now more extensible because of the array and for loops. We can easily create an array to hold the first 100 even numbers. But we still have to change the number five in three different places. You may be wondering if we can eliminate this repetition as well, and it turns out that we can.

Preprocessor Macros

In order to reduce this kind of code repetition, the C language has what is called a *preprocessor*. The preprocessor allows you define *macros* that perform a search and replace on your code. Let's see how this can help us:

Listing 3: main.c Using a preprocessor

macro

```
#include <stdio.h>

#define ARRAY_SIZE 5

int main(int argc, const char * argv[])
{
    int evens[ARRAY_SIZE];
    int i;

    for (i = 0; i < ARRAY_SIZE; i++)
        evens[i] = (i+1) * 2;

    for (i = 0; i < ARRAY_SIZE; i++)
        printf("evens[%d] = %d\n", i, evens[i]);

    return 0;
}
```

The second line in this program defines a new macro named `ARRAY_SIZE`. This tells the compiler to replace all uses of `ARRAY_SIZE` with the number five. The command to define a new macro is `#define`. Because the first character of this command is the *pound character*, this kind of macro definition is often called a *pound define*. While a pound define is very similar to setting a variable, you should not use an equal sign or a semicolon. If we used:

```
#define ARRAY_SIZE = 5;
```

Then, the `evens` declaration would result in invalid C syntax, after the macro replacement:

```
int evens[= 5];
```

With our new macro in place, changing the array size to ten can be accomplished with one simple change:

```
#define ARRAY_SIZE 10
```

Arrays as Pointers

So what's this about arrays and pointers being similar? As it turns out, pointers and arrays can often be used interchangeably in C. A pointer to an integer, `int *`, can be set to an array without any conversion necessary:

Listing 4: main.c Using pointers and arrays

```
#include <stdio.h>

#define ARRAY_SIZE 5
```

```
int main(int argc, const char * argv[])
{
    int evens[ARRAY_SIZE];
    int * pointer;
    int i;

    for (i = 0; i < ARRAY_SIZE; i++)
        evens[i] = (i+1) * 2;

    pointer = evens;
    for (i = 0; i < ARRAY_SIZE; i++)
        printf("pointer[%d] = %d\n", i, pointer[i]);

    return 0;
}
```

We set the variable `pointer` to be equal to the array `evens` without using an ampersand, `&`, the address of operator, like we did in last month's article. Also, notice that the compiler lets us use an array index on the `pointer` variable, just like an array. This is because pointers and arrays are virtually the same in C. You do have to be very careful when using pointers as arrays, though. The C compiler does not know that `pointer` points to an array, instead of an ordinary variable. The compiler simply assumes that if you are trying to access a pointer as an array, you must be right. You can easily introduce subtle and hard to find bugs, so be careful.

If it's so dangerous, why should we use it? In these examples, the sizes of the arrays are set in stone when we compile them. If we want to change the size of the array when the program is running, we have to use pointers as arrays. But before we go over how to do this, we need to take a step back and look under the hood a bit. We need to further understand how computer memory works.

Computer Numbers

Over the last couple of articles, I've been using a box analogy for variables. Each variable is like a box that holds a specific type of data, such as an integer or floating point number. Also, each box is assigned a unique address, which I compared to a P.O. Box number. But real boxes typically hold physical objects like shoes or books. What *is* a number, and how can a box hold one? Do numbers have certain physical characteristics? It turns out they do, and it all revolves around ones and zeroes.

Internally, computers only understand two digits: 0 and 1. Everything a computer does, from the simple math, to complex graphics and sound all boil down to 0 and 1. So how can computers count higher than 1? It's very similar to normal decimal numbers, where we only have ten digits, 0 through 9. By stringing together multiple digits, we can count much higher than 9, to numbers such as 523. Computers can string together multiple zeros and ones, too, to make larger numbers, such as 1101. Because computers only deal with two digits, instead of the usual ten, these numbers are called *binary numbers*. Since humans better understand decimal numbers, we need to be able to convert binary numbers, such as 1101, back into normal decimal numbers and vice versa.

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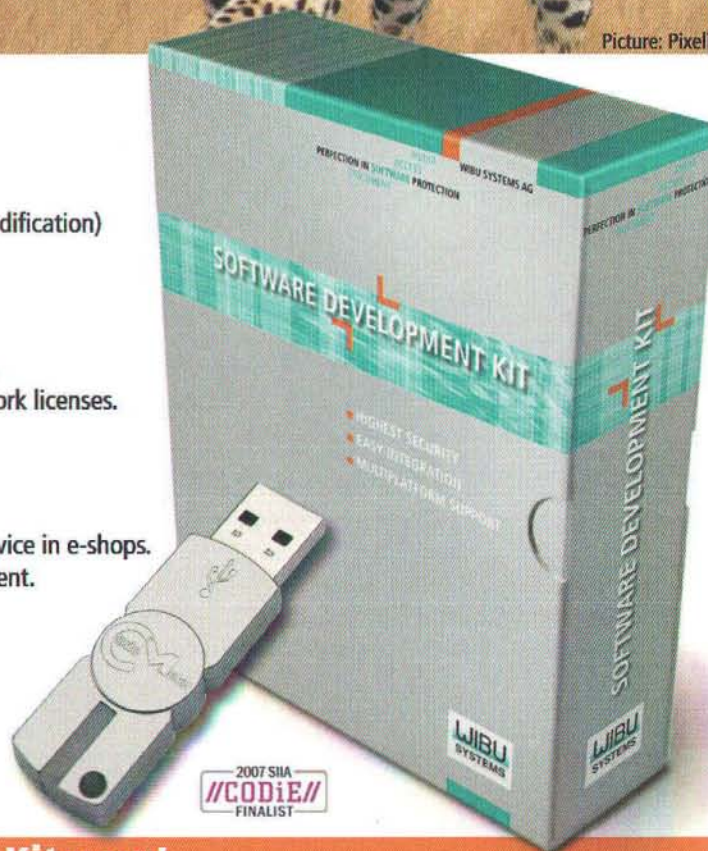
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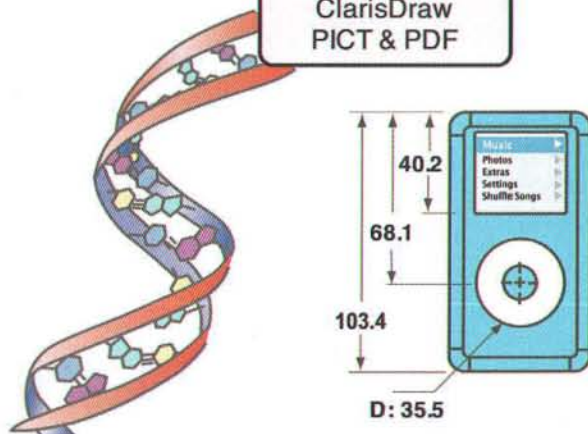
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To convert binary numbers, we once again have to drudge up some simple math. Normal decimal numbers we use every day are called *base-10 numbers* because there are 10 digits, 0 through 9. When digits are strung to create a larger number, like 523, each digit carries a certain *weight*. The base-10 number 523 can be expressed as a simple equation:

$$523_{10} = 5 \times 100 + 2 \times 10 + 3 \times 1 = 500 + 20 + 3$$

The numbers 1, 10, and 100 are the weight of each digit. As we add more digits, the weight goes up by another power of 10 to 1,000, then 10,000, and so on. The small 10 subscript is the mathematical way of clarifying we are talking about a base-10 number. We don't normally include this subscript, as we nearly always deal with base-10 numbers.

Binary numbers work similarly, except there are only two digits available, 0 and 1. To convert a binary number to decimal, we can use base-10 numbers as the weight of each digit. Instead of each weight going up by a power of 10, they go up by a power of 2, i.e. 1, 2, 4, 8, 16, etc. Because binary numbers are based around powers of 2, they are called *base-2 numbers* and a small 2 subscript may be used to denote a binary number. Thus the 1101₂ binary number can be converted to 13₁₀ using the power of 2 weights:

$$1101_2 = 1 \times 8 + 1 \times 4 + 0 \times 2 + 1 \times 1 = 8 + 4 + 1 = 13_{10}$$

Because the use of 0 and 1 for the digits of binary numbers, they have been given the shorthand name of *bit*, which is a contraction of *binary digit*. Binary numbers are often classified by how many bits they have, thus 1101₂ is considered a 4-bit number.

Bytes

As we combine more bits together into one binary number, we can start representing larger and larger numbers. When we have a binary number with eight bits, we can represent a number between 0 and 255. This is because the largest 8-bit binary number is 1111111₂. If we expand this out, using the weight of each digit, we get:

$$1111111_2 = 1 \times 128 + 1 \times 64 + 1 \times 32 + 1 \times 16 + 1 \times 8 + 1 \times 4 + 1 \times 2 + 1 \times 1 = 255_{10}$$

For historic reasons, these 8-bit numbers are the basis of all modern computing and are given a very special name of their own: a *byte*. Thus a single byte can represent any decimal number from 0 to 255.

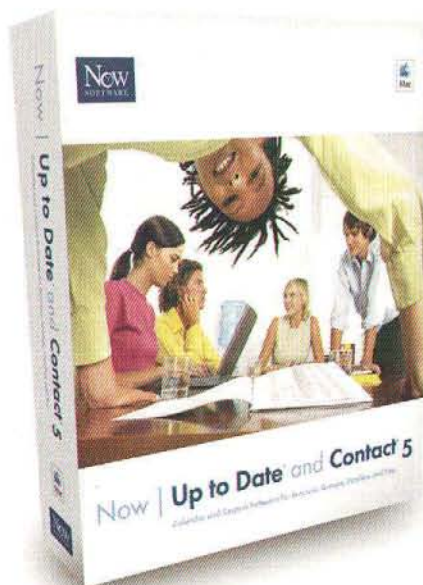
Even though we usually let the compiler translate decimal numbers to binary, sometimes you have to deal directly with bits. Unfortunately, binary numbers can be very tedious for people to write out. To make it easier to represent long binary numbers, without converting to decimal, the computer scientists invented a new notation called *hexadecimal numbers* or just *hex* for short. Hexadecimal numbers are *base-16 numbers* that have 16 digits with the weight of each digit being a power of 16. The only problem is that there are not 16 digits available: only 10. Those clever computer scientists decided to borrow the first 6 letters of our alphabet, A through F, to fill in the blanks. Because all of these number conversions can get quite confusing, I've created Table 1 to help convert between binary, hexadecimal, and decimal numbers.

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Table 1: Binary, Hexadecimal, Decimal Conversion Chart

Binary Number	Hexadecimal Number	Decimal
0000	0	0
0001	1	1
0010	2	2
0011	3	3
0100	4	4
0101	5	5
0110	6	6
0111	7	7
1000	8	8
1001	9	9
1010	A	10
1011	B	11
1100	C	12
1101	D	13
1110	E	14
1111	F	15

To convert larger hexadecimal numbers to decimal, we have to resort to power of 16 digit weights. For example, to convert the hexadecimal number $5FC_{16}$ to decimal, we first convert each hexadecimal digit to decimal using Table 1, and then use powers of 16 as the digit weights:

$$5FC_{16} = 5 \times 256 + 15 \times 16 + 12 \times 1 = 1280 + 240 + 12 = 1523_{10}$$

Using Table 1, we can convert any 4-bit binary number easily to hexadecimal. Converting larger binary numbers to hexadecimal numbers does not even require any math. We just group together 4 bits, and use Table 1 on each group. For example to convert 11011001_2 to hexadecimal, we first chop it up into 2 groups: 1101_2 and 1001_2 . Then, converting each group of four, we get $D9_{16}$. If we wanted to convert this number to decimal, we can use the power of 16 weights, again:

$$11011001_2 = D9_{16} = 13 \times 16 + 9 \times 1 = 208 + 9 = 217_{10}$$

This grouping of 4-bits is called a *nibble*, sometimes spelled *nybble*. By breaking large binary numbers up into nibbles, it's easy convert them into hexadecimal no matter how many bits you have. With words like bits, bytes, and nibbles, it's easy to see why computer scientists have such a good sense of humor.

Bytes of Memory

How do bits and bytes relate to programming variables? All of the boxes used for the variables in your program are stored in the computer's memory. Your computer's memory, called *RAM* (short for *Random Access Memory*) is like the post office, where all P.O. Boxes live. Each box is given a unique number, an address, and each one has the same size. The fundamental size of each box is one byte. But wait... I said earlier that one byte could only hold a number from 0 to 255. So how can an integer variable in C store larger numbers? Well, the C compiler uses multiple, consecutive bytes to create a bigger box. Typically, it uses four bytes, or 32 bits for a variable of type `int`, which is big enough to

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Data Type	sizeof	Largest Signed Value	Smallest Unsigned Value	Largest Unsigned Value
char	1	255	-128	127
short	2	65535	-32768	32767
int	4	4.295×10^9	-2.147×10^9	2.147×10^9
long	4	4.295×10^9	-2.147×10^9	2.147×10^9
long long	8	1.845×10^{19}	-9.223×10^{18}	9.223×10^{18}

Table 2: Standard C Data Types

hold numbers from 0 to 4,294,967,295. That's just over four billion.

What about negative numbers? Computers steal one bit and use it as the sign of a number. This conversion of negative numbers to binary is called *two's complement*. I don't have enough space to fully cover two's complement in this article. If you want to learn more, Wikipedia has a good article [1] that is a great place to start. The end result of using two's complement means that `int`, a signed 32-bit integer, can only hold numbers between -2,147,483,648 and 2,147,483,647. If you need to use larger numbers, and you do not need to use negative numbers, you can use the

`unsigned int` data type when you declare your variables to tell the compiler not to use 1 bit for the sign.

The C compiler has a special operator, called `sizeof`, that returns the number of bytes a variable or data type uses. This operator works like a function, and you pass a variable or type as the argument. For example, this line of code will print 4:

```
printf("%d\n", sizeof(int));
```

Because all programs have different needs, the C language has other integer data types that are stored using a different number of bytes. Table 2 (above) summarizes the standard integer data types and the number of bytes they use on a 32-bit



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Mac OS X program. By default, these data types are signed. You can use the `unsigned` keyword in front of any of these types if you only care about positive numbers.

I specifically said “a 32-bit Mac OS X program,” because the C language does not make any guarantee of these sizes on other operating systems and processors. For example, on a 64-bit Intel Mac OS X program, `sizeof(long)` is not four bytes, it’s eight. If you really, really care about the number of bytes a variable uses, you should use one of the newer data types. In 1999, signed integer data types of the format `intxxx_t`, where `xxx` is a number of bits: 8, 16, 32, or 64 were added. So if you really want a 32-bit signed integer, you would use `int32_t`. There are also unsigned variants, which use `uintxxx_t`. So an unsigned 8-bit integer type would be `uint8_t`. These new types are available in the `stdint.h` header file. Listing 6 demonstrates the `sizeof` operator and these new data types.

Listing 5: main.c demonstrating sizeof

```
#include <stdio.h>
#include <stdint.h>

int main(int argc, const char * argv[])
{
    long foo;
    unsigned long bar;

    printf("sizeof(foo) = %d\n", sizeof(foo));
    printf("sizeof(bar) = %d\n", sizeof(bar));

    printf("sizeof(uint8_t) = %d\n", sizeof(uint8_t));
    printf("sizeof(uint16_t) = %d\n", sizeof(uint16_t));
    printf("sizeof(uint32_t) = %d\n", sizeof(uint32_t));
    printf("sizeof(uint64_t) = %d\n", sizeof(uint64_t));

    return 0;
}
```

Sizes of Computer Addresses

Most computer processors from the 1980s and 1990s use 32-bit numbers internally for addresses, too. Computer processors are classified by the number of bits used for addresses, thus these processors are classified as *32-bit processors*. This means a 32-bit processor only has enough addresses for slightly over four billion bytes of memory, at it’s maximum. Since 1 billion bytes, or more precisely 1,073,741,824 bytes, is called a gigabyte, a 32-bit processor is said to address a maximum of four gigabytes. While this may seem like a lot, this may not be enough for some applications.

You may have heard some buzz about “64-bit.” In fact, 64-bit Cocoa support is one of the new major features of Leopard. Newer computer processors, like the PowerPC G5 and the Intel Core 2 Duo, can use 64-bit addresses. This allows the computer to access more than four gigabytes of memory, which speeds up some programs that work on large amounts of data, such images, videos, and scientific data.

Dynamic Memory

When you declare a variable inside a function, the compiler automatically sets aside the number of bytes necessary for its storage. This setting aside of memory is called *allocating memory*. Once the function finishes executing, the allocated memory is automatically given back to the system, called *deallocating memory*. When the compiler handles memory allocation for you, this is called *automatic memory allocation*. Because the memory of variables inside a function are allocated and deallocated automatically, they are sometimes referred to as *automatic variables*.

Sometimes this automatic memory allocation is not good enough, and you have to take matters into your own hands. The standard C library has a function named `malloc` that allocates the specified number of bytes of memory and returns the address of this new memory. You can assign this address to a pointer, and then use it like we used pointers in last month’s article. Because you manually allocated the memory, you must also deallocate it yourself using the `free` function. When you take control of memory allocation, this is called *dynamic memory allocation*, or *dynamic memory*, for short. Listing 8 is a simple example of dynamic memory.

Listing 6: main.c Using dynamic memory

```
#include <stdio.h>
#include <stdlib.h>

int main(int argc, const char * argv[])
{
    int * pointer;

    pointer = malloc(sizeof(int));
    *pointer = 5;
    printf("**pointer = %d\n", *pointer);
    free(pointer);

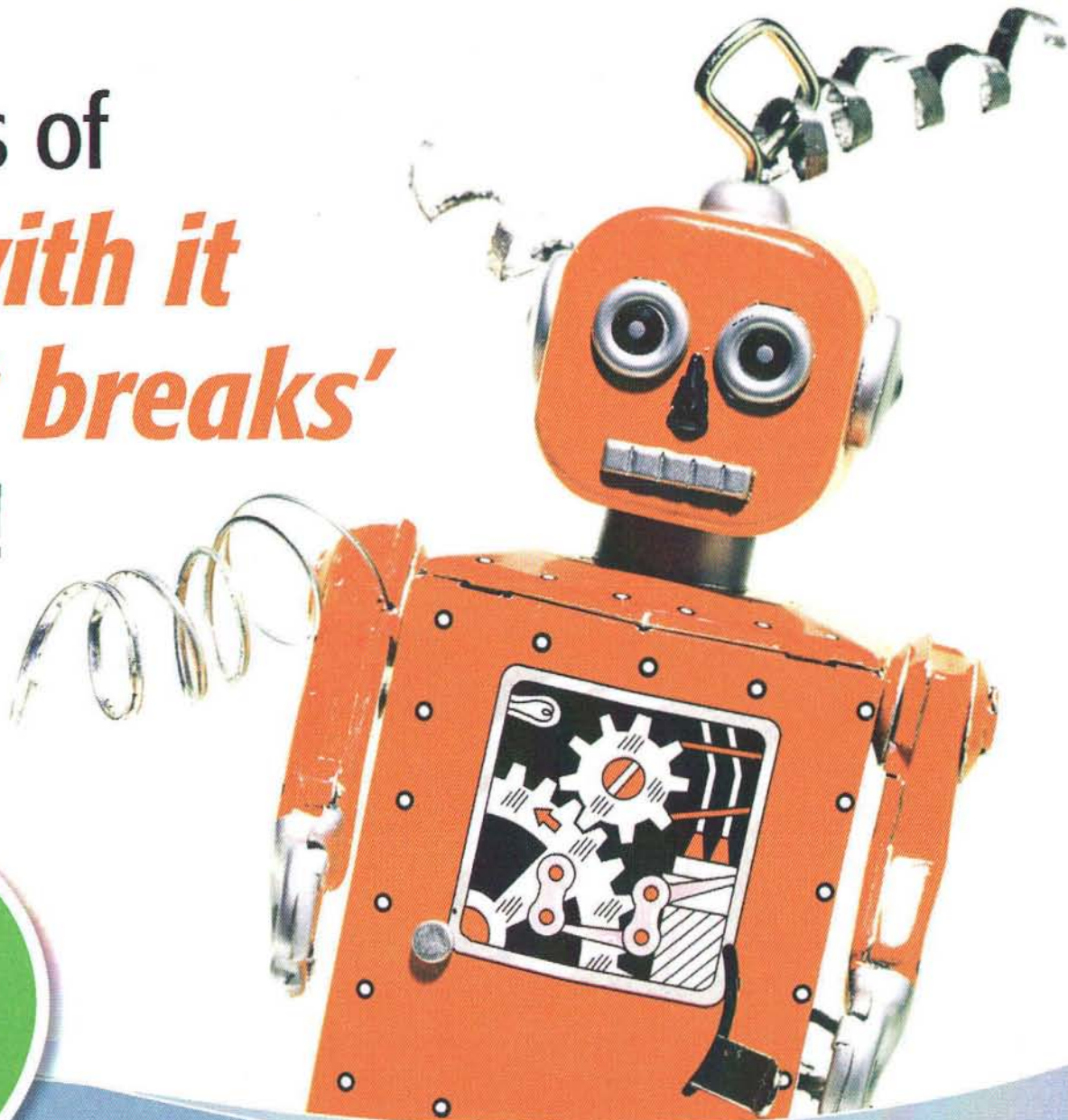
    return 0;
}
```

Along with great power comes great responsibility. As such, it’s very important to deallocate memory that you allocate. Failing to return memory to the system is called a *memory leak*. Memory leaks are a serious class of bugs that can affect the performance of your program and the entire system. There are no magic ways to avoid memory leaks in C. You just have to be very careful and make sure you **free** any memory you allocate with `malloc`. Memory that is leaked by your application is reclaimed when your application exits. This doesn’t mean leaks should be ignored, however. Leaked memory limits the amount of memory available for other tasks, and can slow down the entire system. Objective-C has some techniques to avoid memory leaks, which we will cover in due time.

Dynamic Memory for Arrays

Using dynamic memory, as previously shown in Listing 8, provides no benefit to automatic memory. One real reason to use dynamic memory is when we want to change the size of an array while the program is running. To demonstrate this, let’s

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look at Listing 10, which reads numbers from the user, and prints them in reverse order:

Listing 7: main.c Printing numbers in reverse

```
#include <stdio.h>

#define MAX_LENGTH 25

void read_numbers(int array[], int length)
{
    int i;
    for (i = 0; i < length; i++)
    {
        printf("Enter number %d: ", i+1);
        scanf("%d", &array[i]);
    }
}

void print_in_reverse(int array[], int length)
{
    int i;
    for (i = length-1; i >= 0; i--)
    {
        printf("%d\n", array[i]);
    }
}

int main(int argc, const char * argv[])
{
    int numbers[MAX_LENGTH];
    int length;

    printf("How many numbers? ");
    scanf("%d", &length);
    if (length < 1)
    {
        printf("Choose a number greater than or equal to 1\n");
        return 1;
    }

    if (length > MAX_LENGTH)
    {
        printf("Choose a number less than or equal to %d\n",
            MAX_LENGTH);
        return 1;
    }

    read_numbers(numbers, length);
    print_in_reverse(numbers, length);

    return 0;
}
```

In this program, we have an array of integers, **numbers**, that has a size of **MAX_LENGTH**, which is set to twenty-five. The first thing it does is ask the user how many numbers they are going to type in. It does some error checking on this number to make sure it's not too big or too small. Then, it reads that many numbers into the array. Finally, it prints them out in reverse order. I also introduce some new syntax. When arrays are used as arguments to functions, they cannot include a size. Thus, you use square brackets without a number, for example **array[]**.

Here is a sample run of this program, with my input in bold red:

```
How many numbers? 4
```

```
Enter number 1: 42
Enter number 2: -3
Enter number 3: 523
Enter number 4: 11
11
523
-3
42
```

Great, it seems to work as designed! Unfortunately, this program has one limitation: the user can only enter twenty-five numbers. What if the user wanted to enter 100, or even 1,000 or 1,000,000 numbers? Sure, we could change **MAX_LENGTH**, but this is always going to be a guessing game. And if we make **MAX_LENGTH** very large, then we are wasting memory when the user only wants to enter a few numbers. The solution is to use dynamic memory.

Listing 8: main.c Dynamic size of an array

```
#include <stdio.h>
#include <stdlib.h>

void read_numbers(int array[], int length)
{
    int i;
    for (i = 0; i < length; i++)
    {
        printf("Enter number %d: ", i+1);
        scanf("%d", &array[i]);
    }
}

void print_in_reverse(int array[], int length)
{
    int i;
    for (i = length-1; i >= 0; i--)
    {
        printf("%d\n", array[i]);
    }
}

int main(int argc, const char * argv[])
{
    int * numbers;
    int length;

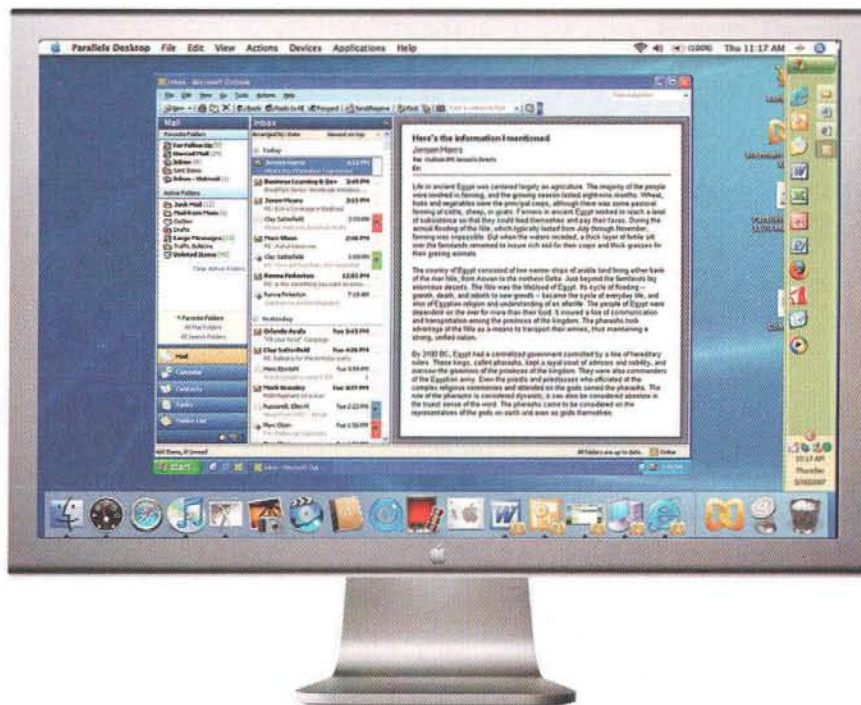
    printf("How many numbers? ");
    scanf("%d", &length);
    if (length < 1)
    {
        printf("Choose a number greater than or equal to 1\n");
        return 1;
    }

    numbers = malloc(length * sizeof(int));
    read_numbers(numbers, length);
    print_in_reverse(numbers, length);
    free(numbers);

    return 0;
}
```

In Listing 12, we changed the type of **numbers** from an array to a pointer. After getting **length** from the user, we allocate the needed memory with **malloc**. Because **numbers** is now a pointer – and pointers are interchangeable with arrays – we don't have to change the arrays in the function arguments.

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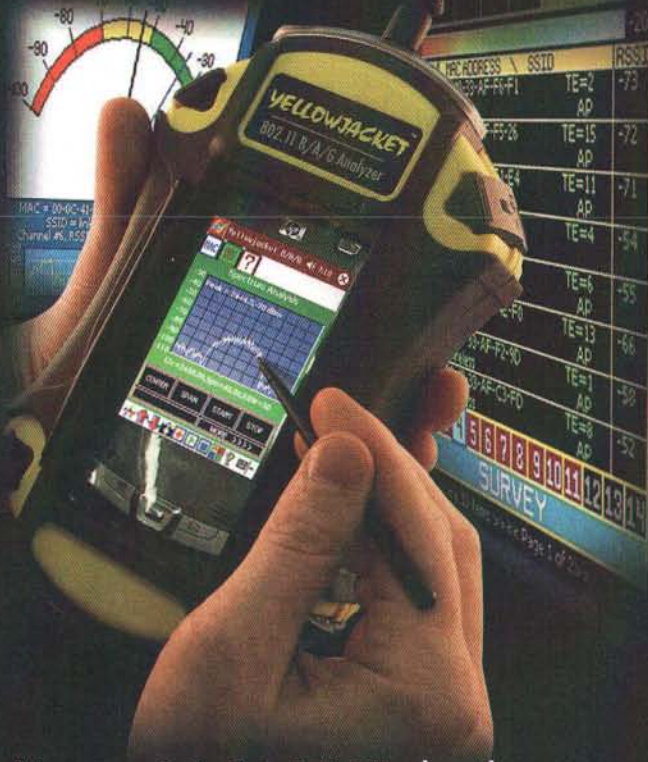
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The trick for using `malloc` on arrays is to use the `sizeof` operator to allocate the correct number of bytes. Remember that each integer uses four bytes of memory. Thus, five integers require twenty bytes of memory. This is why we multiply `length` by `sizeof(int)`. By using `malloc` to allocate memory, we've solved two issues. First, the only limit on the size of the array is the amount of memory the user's computer has. We can eliminate the `MAX_LENGTH` constant and our error checking on the maximum size. Second, we are only allocating memory that we need. We are not wasting memory by only using a portion of a larger array.

This also demonstrates the importance of using the `sizeof` operator, instead of hard coding the number four. You don't have to remember how many bytes an integer uses. It also makes your program more portable. Because an integer may use a different number of bytes on a different computer, this program will compile on any platform that can compile C. While you may not plan on running your software on a different computer, it's impossible to see the future. Even if you stick to writing only Mac software, Apple has switched processors a number of times, from 68000, to PowerPC, and now Intel. Who knows what Macs will be running on in another ten years?

Conclusion

We've covered a lot of background information in this article. While these examples may seem trivial, the basic concepts they illustrate lie at the heart of Objective-C and programming for Mac OS X. Once we finally get to some "real" Mac programming, our time spent going over all this background information will be time well spent.

Footnotes

[1]: Wikipedia Two's Complement article.
http://en.wikipedia.org/wiki/Two's_complement

Ma

About The Author



Dave Dribin has been writing professional software for over eleven years. After five years programming embedded C in the telecom industry and a brief stint riding the Internet bubble, he decided to venture out on his own. Since 2001, he has been providing independent consulting services, and in 2006, he founded Bit Maki, Inc.

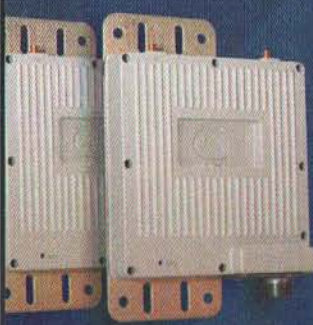
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FTP Clients for Mac OS X

Roundup of some popular FTP client apps

By Mary Norbury

Introduction

This article will cover a few of the most popular FTP clients for Mac OS X. We'll look at a mix of open source, and shareware/commercial software available. The personal choice of an FTP client is based on how stable the app is, how securely it handles data transfers, and how well the features of the app meet your current needs.

FTP Basics

As a brief overview, let's cover some FTP basics to bring ourselves up to speed. FTP is an interactive protocol used for file transfer over any TCP supported network. Networked hosts create connections to each other in order to transfer data between a client machine and a server. The FTP server uses port 21 (also called the command port) to listen for a connection from an FTP client and port 20 to send data from (also called the data port) but we'll see that the data port can be redirected to a different/random port. The initial greeting consists of the FTP client sending a request via a command to the server and the server sending back a response to either accept or reject the connection. This two-way communication where commands are passed is called the control stream and occurs in plain text. The next step in the process is the actual file transfer, which requires a different socket connection called the data stream. Three different transfer modes dictate how the data stream is set up:

Active mode: The FTP client opens a random port (port # > 1023) and sends the random port number over the control stream using the PORT command with the IP and port number as argument. The server connects back to the client in this scenario.

Passive mode: The FTP server opens a random port (port # > 1023) and sends the server's IP address and the port number to the FTP client and then the server listens. The FTP client would respond with the PASV command. The client connects to the server in this scenario.

Extensive passive mode: The FTP server acts as in the passive transfer mode but, in this case, only sends the port number and assumes the client will use the same IP it initially connected to. Again, the client connects out to the server.

Data is commonly sent in either ASCII or binary formats, although most FTP clients use ASCII by default as their data transfer mode.

An obvious problem with FTP is one of security: commands, passwords, and directories are sent in clear text and are not encrypted in any fashion. As we'll see with our choices for FTP clients in this article, this can be made more secure by using FTPS (FTP over SSL) or SFTP (SSH File Transfer Protocol).

On With the Show...

CAPTAIN FTP



Figure 1. Captain FTP

Captain FTP version 5.0 is a shareware product available for \$25 from <http://captainftp.xdsnet.de/>. You can try out the application for a 14-day evaluation period before purchasing a

license. Captain FTP bills itself as “the very first cooperative FTP client” by allowing local network file sharing via FTP. This facilitates project collaboration among co-workers. The application sports a tabbed interface with the tabs representing separate FTP sessions. Drag and drop between tabs is supported. The main application window has a two-pane browser format with two sets of navigation controls. By default, your computer view is shown in both panes when you’re not connected. These browser panes are multi-purpose: they can show remote or local files, or two remote FTP servers. Connections are set up via the **Remote** item in the menu bar.

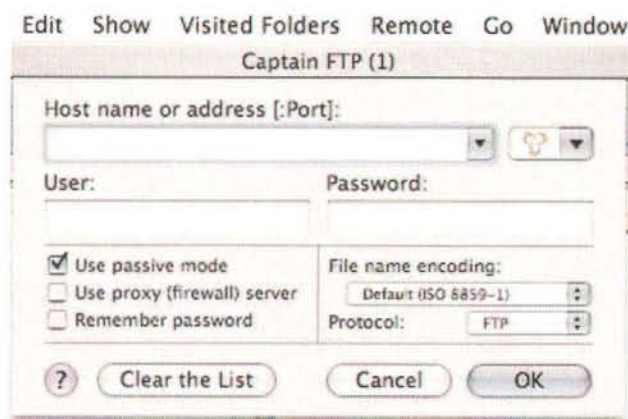


Figure 2. Captain FTP Connection Settings.

The menu bar can be customized to show more actions or the server connections that exist in your Captain FTP address book.

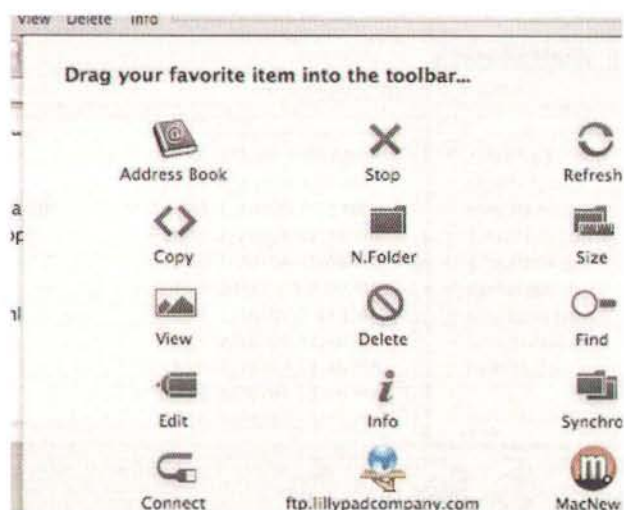


Figure 3. Captain FTP Toolbar Customization.

Captain FTP also has a preview drawer on the right side of the main window and a tasks drawer below the main window that are collapsible.

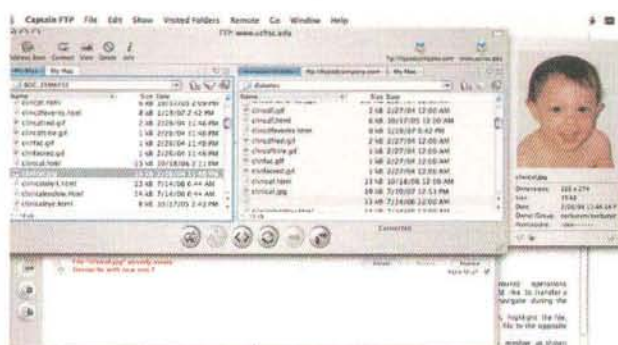


Figure 4. Captain FTP Preview and Tasks Drawers.

The transfer manager is a separate window that manages individual transfers (pause, halt, resume) and allows for scheduling file transfers. Transfer status is easily viewed and prioritized through this window.

Captain FTP supports AppleScript and the help documentation comes with sample scripts for browsing and uploading.

The Captain FTP dashboard widget can be downloaded at the developer's download site (<http://captainftp.xdsnet.de/cftp/download.html>). The Widget does auto-populate the connection settings when the FTP server is selected from the pop down list (Captain FTP address book). Uploads worked very well and without any issues.

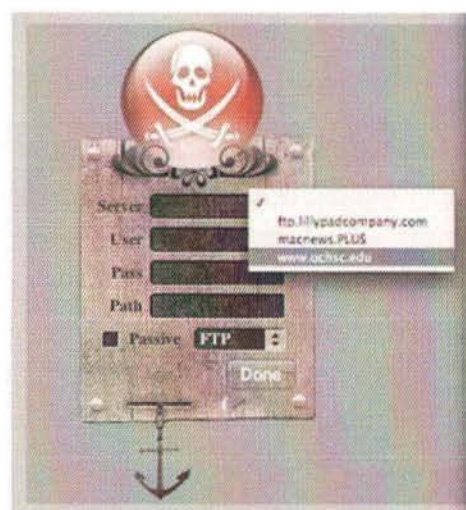


Figure 5. Captain FTP Widget.

A few other items of note: Captain FTP supports FTP/SSL-FTP/SFTP encryption protocols,

file sharing transfers are restricted to authorized users by user authentication and IP access,

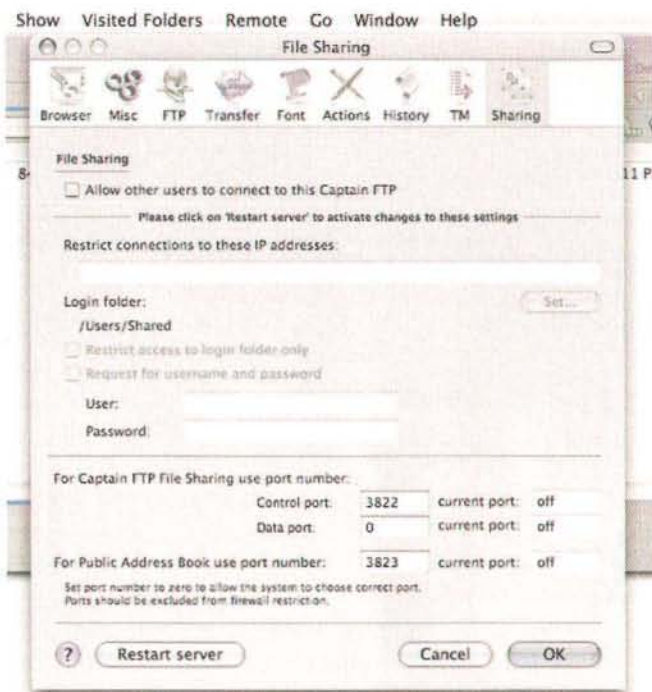


Figure 6. Captain FTP Sharing Preference Pane.

Captain FTP also includes WebDAV transfer capabilities, Growl notification, and external text editors are also supported.

CYBERDUCK

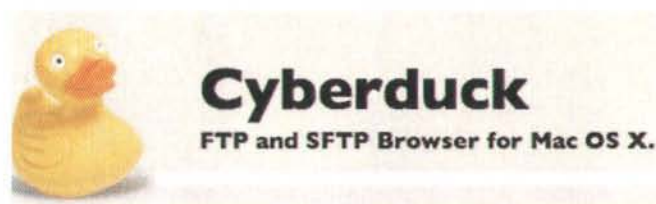


Figure 7. Cyberduck

Cyberduck (<http://cyberduck.ch/>) is an open source browser that supports FTP, FTP/TLS (FTP secured over SSL/TLS), and SFTP (SSH File Transfer Protocol). The download consists of the Cyberduck app, a Widget for rapid uploads, an AppleScript samples directory, and links to the developer home and donation pages. The current stable release version is 2.7.3 (build 2930) and a beta release of version 2.8b1 (build 3161).

Cyberduck is a Cocoa app with multiple localizations, support for external editors (SubEthaEdit, BBEdit, TextWrangler,

TextMate, and others), full AppleScript integration, and support for Bonjour, Keychain, Spotlight, and iDisk bookmark synchronization. There is also support for Growl and recursive permissions modifications.

Cyberduck has a lean interface, with a bookmarks drawer, fully customizable toolbar accessed through the **View** menu item, and sortable columns.

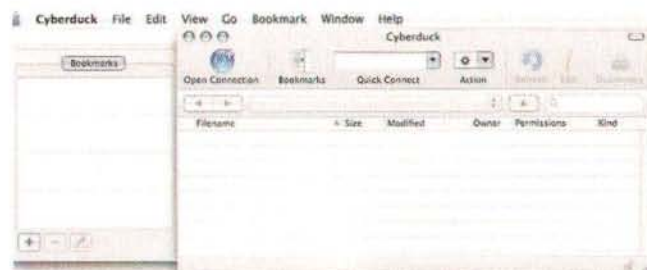


Figure 8. Cyberduck GUI

Connections are easily configured and bookmarked via the Open Connection sheet.

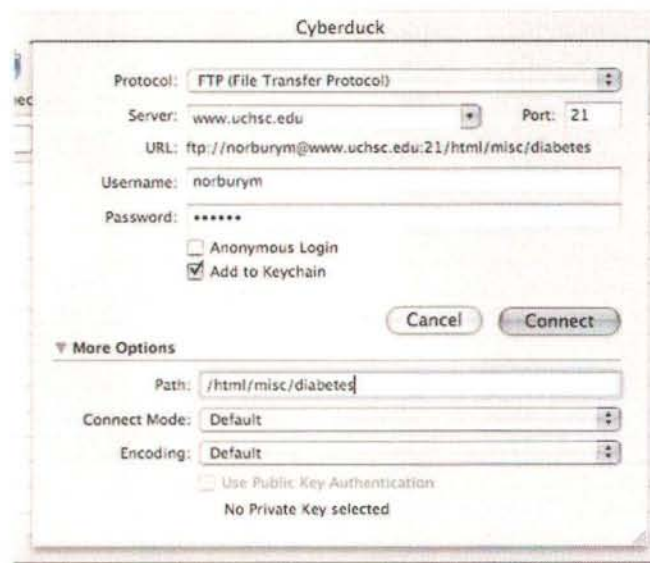
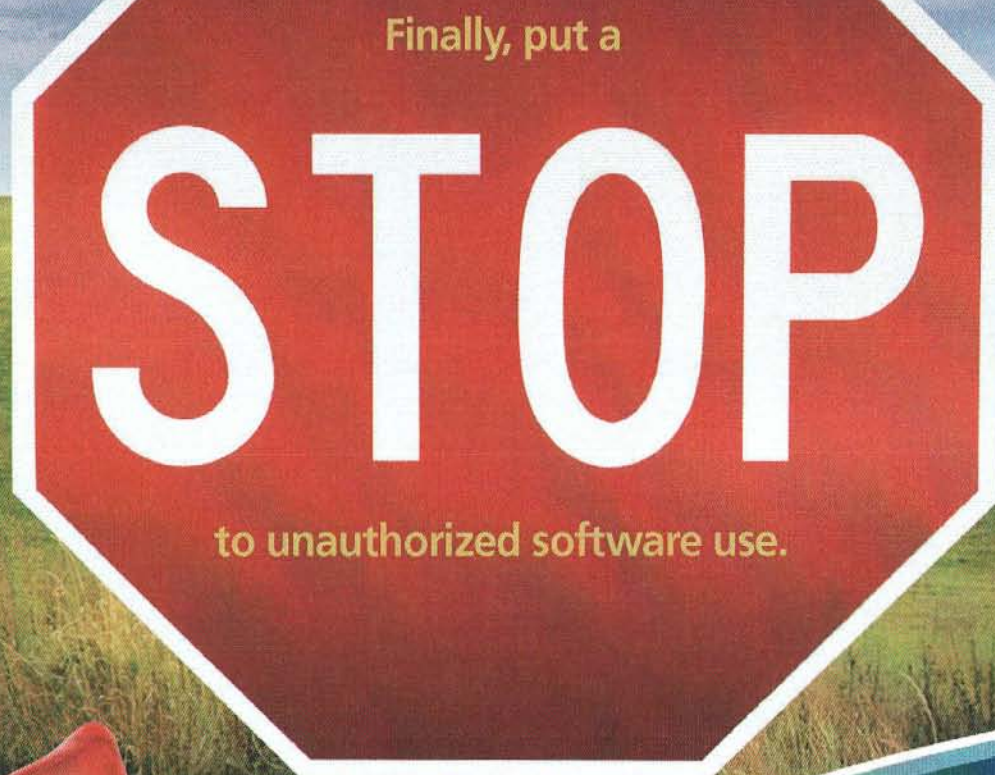


Figure 9. Cyberduck Connection Sheet.

Once the connection is established, Cyberduck uses the Finder for local directory access via drag and drop, which is a bit of an annoyance. It would be nice to see the local directories show up in a pane next to the bookmarked FTP server directories. It would be helpful for file modification date comparison and just file directory matching.

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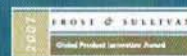


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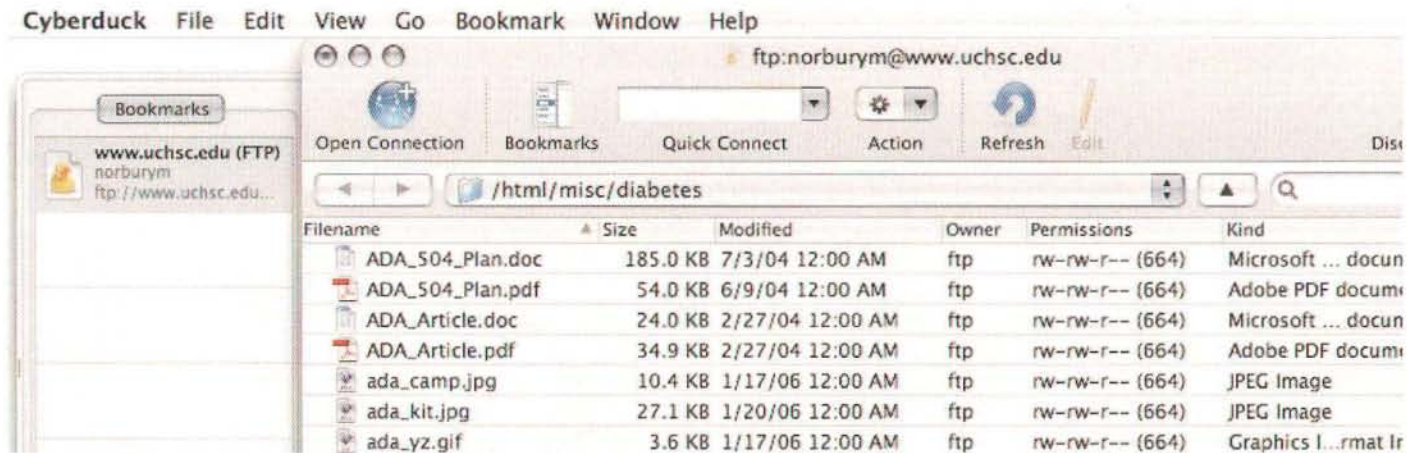


Figure 10. Cyberduck FTP server directory listing.

Cyberduck comes with a suite of sample AppleScripts including recursive listing of server folder contents, remote and local directory synchronization, a folder action script for uploading files, and others. Since it's a simple matter of

```
tell application "Cyberduck"
...
end tell
```

you can script pretty much any routine use of the application.

The Cyberduck widget requires configuration even though the bookmarks appear in a pop down list at the top of the Widget. Selecting a bookmark doesn't auto-populate the FTP connection settings. I also had problems with the Cyberduck app quitting unexpectedly when dropping files on the Widget and not completing the upload.



Figure 11. Cyberduck FTP Widget Settings

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[MACTECH043]



Although a freeware app, donations are accepted for ongoing development of Cyberduck via a link on the website.

FETCH



Figure 12. Fetch.

Fetch is a venerable FTP client and now a Universal app at version 5.2.1, available from the developer's website (<http://www.fetchsoftworks.com/>) for a 14-day trial version or \$25 for a licensed copy. Fetch supports SFTP, FTPS, and FTP with Kerberos connections, external editors including GraphicConverter for graphics editing on the remote server, automatic passive transfer mode, support for Bonjour, folder

synchronization using a GUI version of the `mirror` command, droplet shortcuts, AppleScript recording, and Automator actions.

After installation, Fetch opens a new connection sheet at launch and automatically populates a separate shortcut window with FTP servers detected through Bonjour.

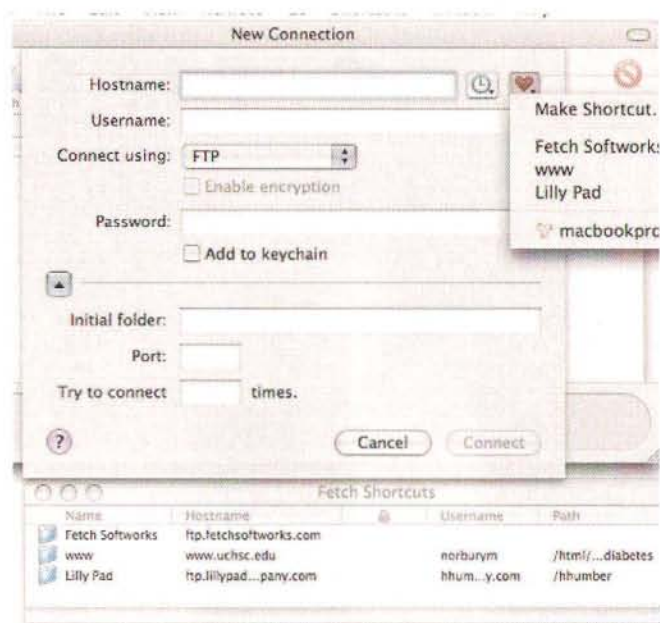
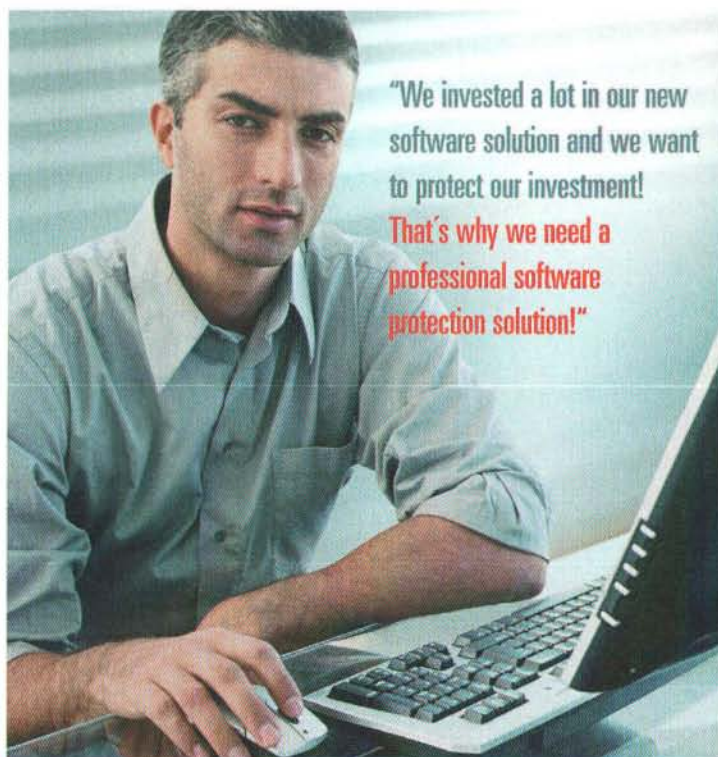


Figure 13. Fetch Connection Settings.



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Fetch contains a single main window showing the remote FTP Server directory listing. Files are transferred using the Get or Put button in the toolbar or by dragging and dropping local files from the Finder.



Figure 14. Fetch File Transfer.

Fetch also recently added a new feature in version 5.2 called WebView which allows you to view files in a web browser and copy web addresses while in Fetch. So, you can use WebView to see your corresponding Fetch files in your Web browser and then copy the URLs using the Copy Web Address function.

Fetch fully supports AppleScript and Automator actions. Ben Waldie wrote a complete article on AppleScripting Fetch in MachTech Vol. 22, Issue 5. The current version of Fetch includes an updated AppleScript dictionary (for a complete summary, see <http://fetchsoftworks.com/FetchWebHelp/Contents/WhatsNew/AppleScriptChanges.html>). A very good selection of sample AppleScripts can be downloaded at the Fetch downloads page (<http://fetchsoftworks.com/downloads.html>) and you can also take advantage of Fetch's ability to record through Script Editor and create your own custom scripts.

Fetch also includes a number of Automator actions to create workflows. Automator workflows can be saved as application droplets; for example, you can drag files onto the droplet to complete tasks like uploading and then changing file permissions.



Figure 15. Fetch and Automator.

The Fetch Widget is very slick and uploads files very quickly. It gets the job done without too much fanfare and complication.

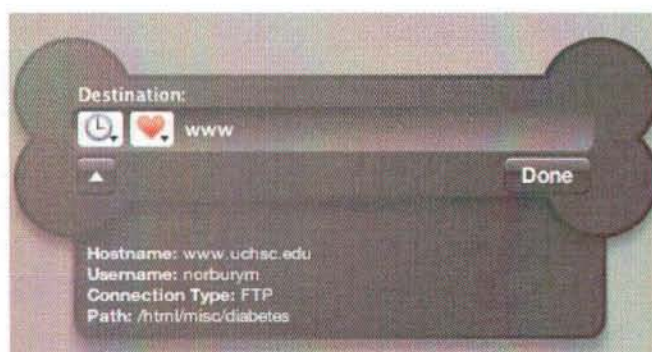


Figure 16. Fetch Widget.

FUGU

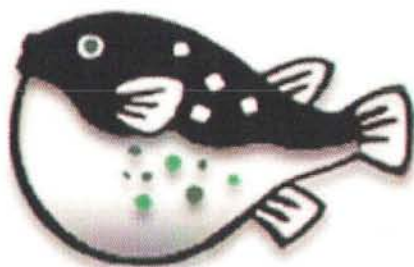


Figure 17. Fugu.

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Created at the Research Systems UNIX Group at the University of Michigan, Fugu 1.2.0 is an open source, graphical front end to OpenSSH's command line SFTP and SCP (secure copy) applications [Ed. note: unlike other apps in this article, Fugu does not work with traditional ftp servers]. Fugu is a Universal binary app available as source tarballs or disk image on the RSUG Web site (<http://rsug.itd.umich.edu/software/fugu/download.html>). Winner of the 2003 Apple Design Award for Best OS X Use of Open Source, licensing is BSD style. Full source code is available with revision history documentation via anonymous CVS or through <http://rsug.itd.umich.edu/cgi-bin/cvsweb.cgi/fugu/>. Several localizations are also supported.

Launching Fugu gives you a two pane main window. The left pane contains your local files and the right pane is initially used to set your FTP connection.

Fugu supports Bonjour and you can save your server connections as favorites.

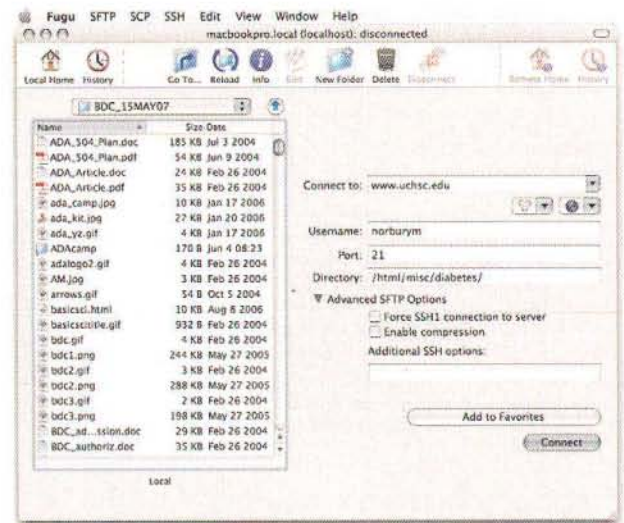


Figure 18. Fugu FTP Connection Settings.

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After connecting to your remote FTP server, the right pane contains the remote file directory. You can drag and drop files between panes or drag files from the remote directory to the desktop or open Finder window. Since the SFTP client that Fugu wraps doesn't support folder downloads, Fugu uses SCP to complete the folder download.

Fugu also supports tunneling over SSH. An SSH tunnel creates a secure communication tunnel from your computer to the remote FTP server. The SSH tunnel encrypts your login credentials and forwards them to the remote FTP server for authentication. Using the SSH menu item, select **New SSH Tunnel**. After the tunnel has been started, you can securely transfer files.

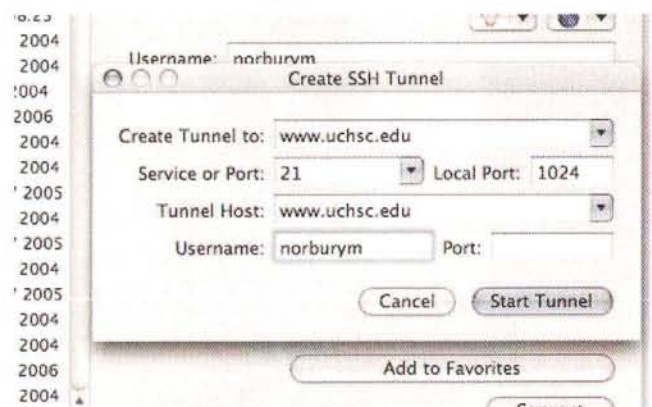
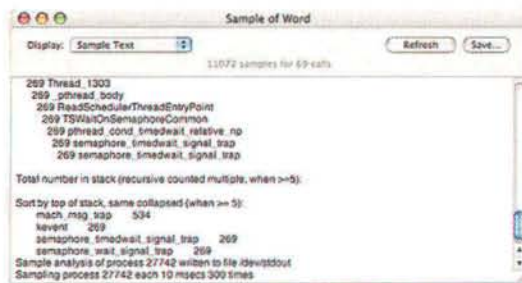


Figure 19. Fugu SSH Tunnel.

Fugu includes a basic AppleScript dictionary that can be accessed through Script Editor.

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INTERARCHY

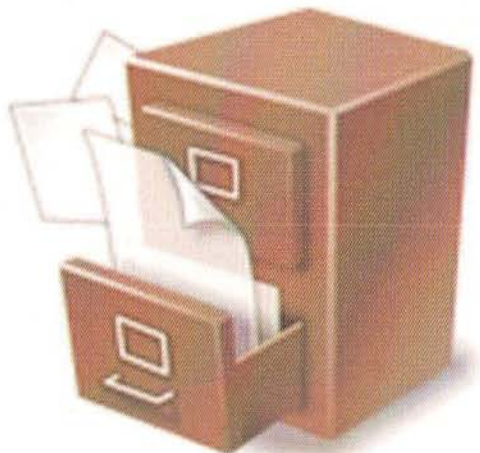


Figure 20. Interarchy.

Nolobe Software (<http://nolobe.com/interarchy/>) acquired Interarchy from Stairways Software in early 2007 as a developer buyout; the lead developer of Interarchy (previously known as Anarchie) spun off his own company in order to acquire the application. A single user license of Interarchy costs \$59.95, with multi-seat, upgrade, and educational pricing available.

Interarchy 8.5.3 transfers files via FTP, SFTP, FTP/SSH, FTP/SSL-TLS, WebDAV, and WebDAV over HTTPS. It also supports mirroring between local and remote directories, scheduling for task automation, allows for HTTP listing with Web links, and iDisk access. Interarchy goes beyond the definition of a "basic" FTP client by providing a full suite of network analysis tools like packet sniffing, host information (IP, DNS name, MX records), trace route, ping, and port scan.

At launch, Interarchy opens a Bookmarks main window pre-populated with Interarchy and Nolobe favorites in the right pane and collections of bookmarks in the left pane.



Figure 21. Interarchy Bookmarks.

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Using the Connect to Server bookmark (or File – Connect to Server from the menu bar), connection settings can be entered into a new List window.

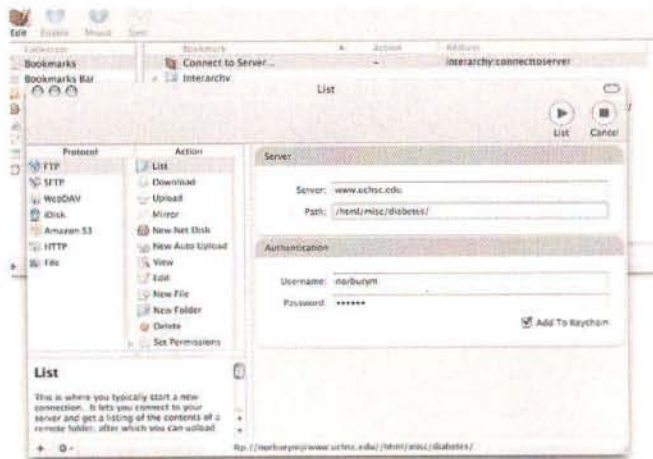


Figure 22. Interarchy Connection Settings.

After a connection to the FTP server is established, the List window shows the requested directory on the remote server. Files are transfers by drag and drop from the Finder.

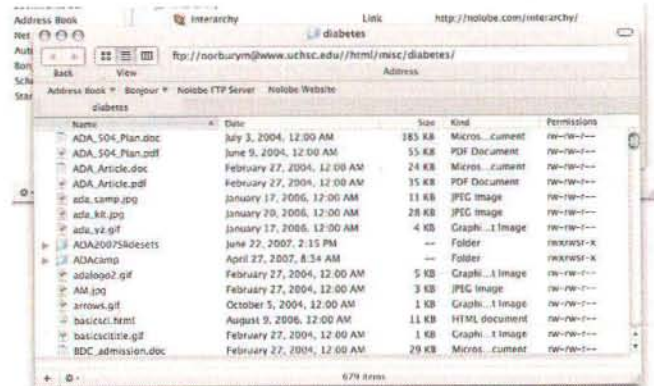


Figure 23. Interarchy Remote Server Listing.

Interarchy supports Automator actions and is AppleScriptable and recordable. The AppleScript dictionary for Interarchy includes an FTP Suite, Standard Suite, Standard URL Suite, and the Interarchy Suite. HTTP actions (weblist, webview, getwebsite, etc.), local actions (filelist, fileremove, filesetpermissions, etc.), perform mirrors, and create and control virtual Net Disks. Interarchy includes three Automator actions: List URLs, Download URLs, and Upload Files.

You can also script Interarchy from the Terminal by installing the Interarchy Command Line Tool from the Preferences window of the GUI app.

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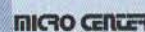
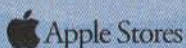


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The network tools suite included in Interarchy is accessed through the **File** item in the menu bar and selecting **Net** from the menu list.

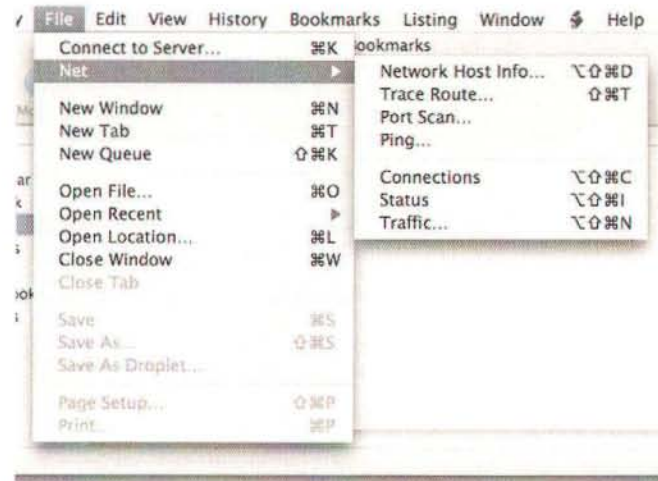


Figure 24. Interarchy Network Tools Menu.

Interarchy will prompt you to install by providing your local admin credentials. You can use a number of network tools from within Interarchy.

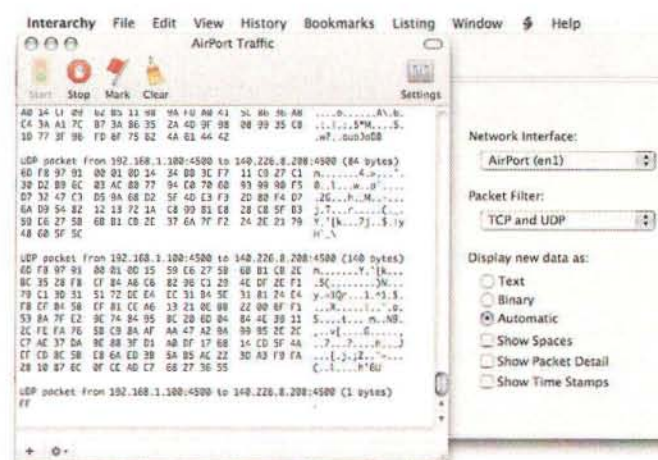


Figure 25. Interarchy Network Interface Tool.



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A Widget is available to allow for quick uploads and a separate Interarchy Network Status Widget that monitor individual network interfaces.



Figure 26. Interarchy Network Status Widget.

The Nolobe website is a bit difficult to maneuver and locating specific information is difficult. However, the Help file built into Interarchy has extensive documentation.

While Interarchy appears to be a bit pricey at first glance, it's an extremely full-featured application. If all you want is a basic FTP client, then look elsewhere. Interarchy is for more experienced administrators who are looking for a complete FTP and network analysis package.

RBROWSER



Figure 27. RBrowser.

RBrowser 4.4.1 is a Universal Binary and is available from <http://www.rbrowser.com/>. RBrowser comes as a free, unlicensed version that includes remote editing (called SaveBack) and SFTP with SSL. The single user license costs \$35 and includes unrestricted access to all protocols (FTP/SSL/TLS, SFTP-SSH) and Folder Sync which preserves HFS Metadata (retains fork data, type/creator, and attributes on Mac-to-Mac transfers, both local-local and local-remote). Auto detection allows RBrowser to decide which protocol to use without need for user configuration.

Launching RBrowser brings up a File Viewer for the local host. Select a new connection through Go item in the menu bar and choosing New Site....



Figure 28. RBrowser Connection Settings.

After the auto-detection process for selecting the correct protocol, a directory listing for the remote FTP server will appear in the remote File Viewer window. A status drawer is located under the main window to provide connection and transfer status.

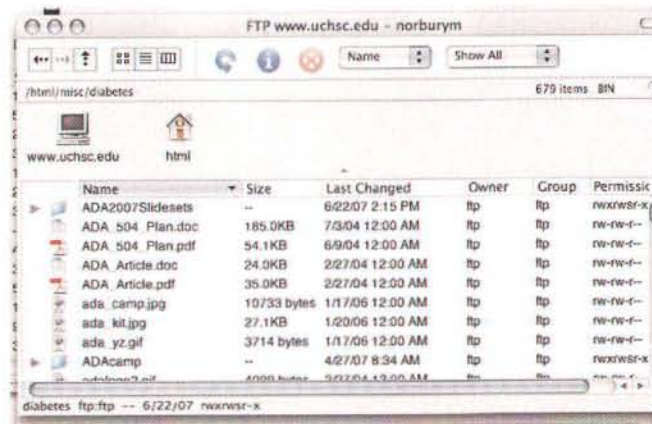
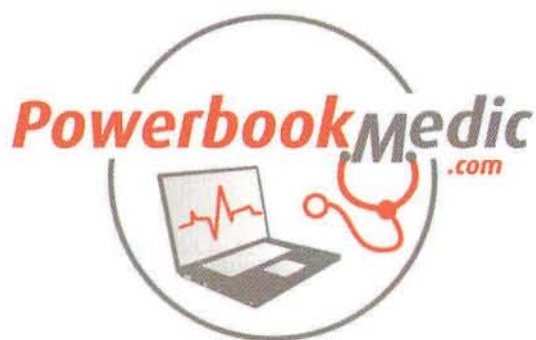


Figure 29. RBrowser Remote File Viewer.



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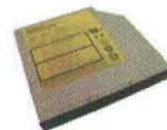
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Folder Sync (licensed version only) is a feature that allows synchronizing via several scenarios: local to local (ex. Mac – external drive), local to remote (Mac – remote host like an FTP or backup server), and remote to local (remote host like a backup server – Mac).

RBrowser is AppleScriptable but does not come with dedicated Automator action files.

I experienced several annoyances with RBrowser: slow connections to remote servers/directory listings and a single click on the file name will make it immediately editable. Since I tend to click on the name rather than the smaller icon, I found myself repeatedly having to re-click on another column to get out of the file name edit before I deleted the entire file name.

TRANSMIT



Figure 30. Transmit.

Transmit 3.5.6, available from Panic (<http://www.panic.com/transmit/>) is \$29.95 for a single copy license. Multi-user, upgrade, and educational pricing is available.

Transmit is a Universal app with a clean, elegant interface. It supports external editing (including graphics), Growl notifications, folder size calculations, droplets, zooming previews, FTP, SFTP, TLS/SSL, server to server transfers, iDisk/WebDAV, DockSend, .Mac synchronization, AppleScript, and Automator actions.

Launching Transmit opens the main window with dual panes: the left pane lists your local files and the right pane initially shows the remote FTP server connection settings. You can optionally view the sidebar to right of the main window (where you can add folders for easy access) or the transcript drawer below the main window (which shows the progress of FTP connection communication).

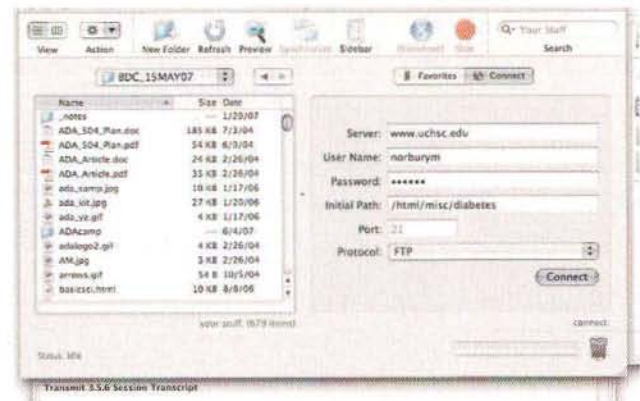


Figure 31. Transmit Connection Settings.

Once connected to the remote server, the right pane contains your remote directory listing. You can change the sidebar to a preview pane to view and zoom in (using the magnifying glass icon) on files in either local or remote directories.



Figure 32. Transmit Remote Server Listing.

Transmit's Widget worked without a hitch once configured.



Figure 33. Transmit Widget.

Transmit has an extensive AppleScript dictionary. You can download a Sample AppleScripts folder from <http://www.panic.com/transmit/d/Transmit%20Sample%20AppleScripts.zip> that contains a number of example scripts for creating droplets, listing, and synchronizing files.

Transmit also has Automator support for uploading, downloading, and synchronizing files.

YUMMY FTP



Figure 34. Yummy FTP.

Yummy FTP 1.6.1b3 (<http://www.yummysoftware.com/>) has a 30 day demo version or a single user license for \$25. Multi-user, site, educational, and non-profit licensing are also available.

Yummy FTP has full SFTP support, supports local and remote directory synchronization including scheduling, remote editing, preview, FTP aliases on the desktop, is AppleScriptable, enhanced Growl support, and color labels.

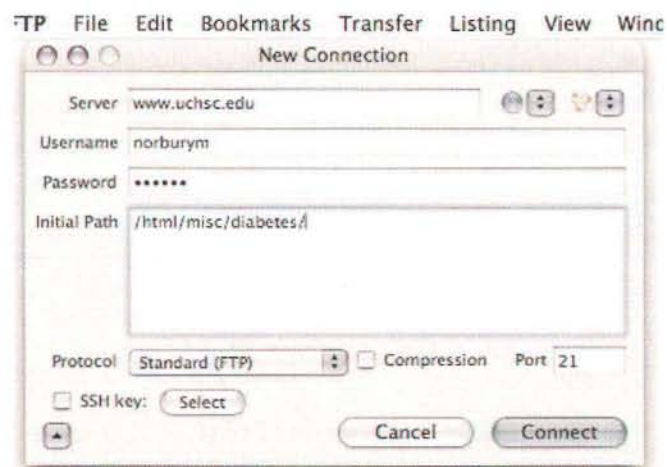


Figure 35. Yummy FTP Connection Settings.

Yummy FTP opens in the default Mac Browser mode, with local files listed in the left pane and remote server files in the right pane.



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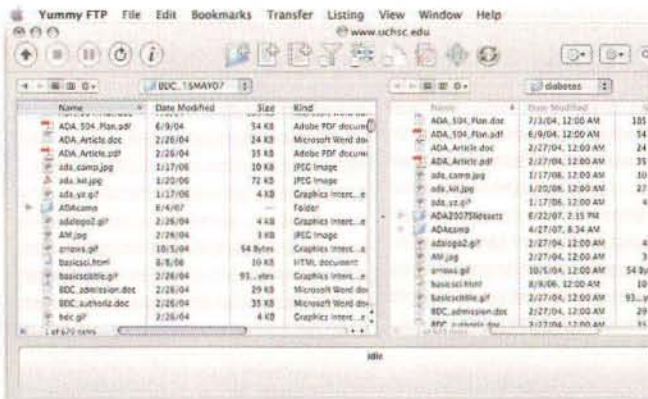


Figure 36. Yummy FTP Default Mac Browser.

Alternatively, you can open the transcript window under the main browser, the queue drawer under the transcript window, and the preview drawer, which appears to the right of the main browser window.

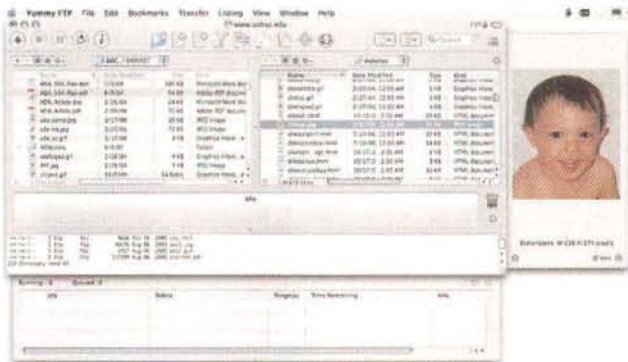


Figure 37. Yummy FTP Optional Views.

A nice feature in Yummy FTP is called DualBrowse: both local and remote sites are synchronized and folder linked so you can browse both local and remote directories simultaneously. DualBrowse can be toggled on or off in the toolbar.

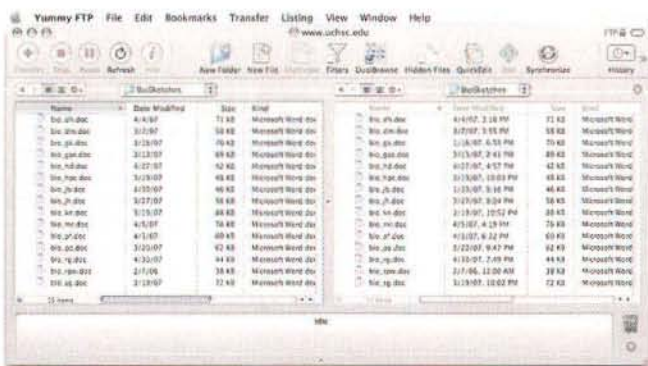


Figure 38. Yummy FTP DualBrowse.

Yummy FTP does not have a Widget but it does have both desktop aliases and AutoRoute, which is a functionality that allows for dropping files onto the Yummy FTP dock icon for automatic uploading to a preconfigured server (similar to Transmit's DockSend). I find the FTP aliases and AutoRoute much more useful than a Widget which requires more keystrokes and manual dexterity.

Yummy FTP does not have included Automator actions but since it is AppleScriptable and recordable, you can create workflows. Under the Help menu item, you can select Yummy FTP Extras to download a set of AppleScripts for multi-site uploads, save and upload, mirror on demand, update Mac on demand, and update server on demand.

Conclusions

The clients covered in this article are a cross section of many of the top downloaded apps. There are many more FTP clients that I didn't have time or space to cover and many are favorites for specific features or have special functionality that other clients don't sport. If you have one you love, drop me an email and let me know why.

References

The AppleScripting Fetch article referenced is MacTech Issue Vol. 22, Issue 5 and was written by Ben Waldie.



About The Author

Mary Norbury is IT Director at the Barbara Davis Center for Childhood Diabetes, an affiliate center at the University of Colorado at Denver and Health Sciences Center in Aurora, Colorado. She has extensive experience in cross-platform systems implementation and administration in the education sector. You can reach her at norburym@mac.com.

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Quoting in the shell

Dealing with interesting characters in shell programming

By Philip Rinehart, Yale University



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QUOTES?

This month, a rather interesting problem arose on the Macenterprise mailing list. How are quotes used and dealt with when scripting for the bash shell? It can be a particularly difficult problem, as OS X allows the use of non-standard characters and spaces in filenames. If quoting is not done properly, unexpected, and even disastrous results may occur. Anyone, remember iTunes 2.0 and destruction of hard drive data? It was a quoting problem! Thus, it is extremely important to quote things properly when shell programming, both for unexpected results, as well as properly sanitizing input.

Single Quotes?

Let's start the process by looking at the use of single quotes in bash shell scripting. The original question was about the use of a directory listing. The directory listing was then piped to a second command, which failed due to spaces in some of the directory names. The specific example:

```
ls -F /Applications
```

Try it. Note how many Applications contain spaces in the name. If Adobe Acrobat 8 Professional were installed, any shell script attempting to perform an action on the path would fail. Why? As the shell interprets spaces as input separators, Adobe, Acrobat, 8 and Professional are all seen as individual paths. In our above example, if the **chmod** operation were being performed, "Adobe", "Acrobat", "8" and "Professional" would all be modified by chmod. This action would fail naturally, as each of these paths does not exist. Would using single quotes help?

Single quotes treat all information contained between single quotes as exact character data in the bash shell. In practice, single quotes are extraordinarily difficult to use as variables and are not expanded. Even the backslash character is not considered special within single quotes. In our example, this fact means that a variable cannot be used in single quotes

when shell scripting. As a result, single quotes aren't going to solve the problem above, so a different solution is required.

Double Quotes?

What about the use of double quotes? Can they solve the problem? Hmm, it gets a bit closer this time. Again, let's use the above list command. When assigned to a variable, multiple words will be treated as a single word. Wow, what a mouthful! Here's a better example. Let's use Adobe Acrobat 8 Professional again. When talking about single quotes, remember the fact that each word is treated separately? With double quoting, the **entire** word remains intact, and is not split. So, if the variable **test** is assigned and then echoed out using double quotes, the entire word, Adobe Acrobat 8 Professional, is used. A brief shell script snippet to further reinforce this concept:

```
#!/bin/bash
test="Adobe Acrobat 8 Professional"
printf "Single word is $test\n"
```

Note, that when these commands are entered and run that the variable is correctly displayed with printf. Without the quotes, only the word **Single** is printed. Does this solution work for the problem encountered on the list? Well, not quite. It certainly gets somewhat closer, as spaces are correctly preserved with double quotes, but command substitutions with variables still see each space separated entry as a separate word. If single and double quotes won't solve the problem, what will? Can the field separator be altered, and will it solve the problem?

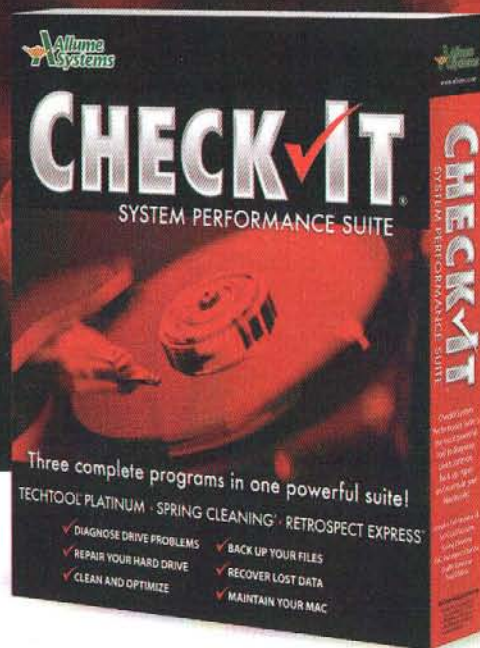
IFS

IFS? Never heard of it before? IFS stands for **I**nternal **F**ield **S**eparator. It determines how bash interprets word boundaries.

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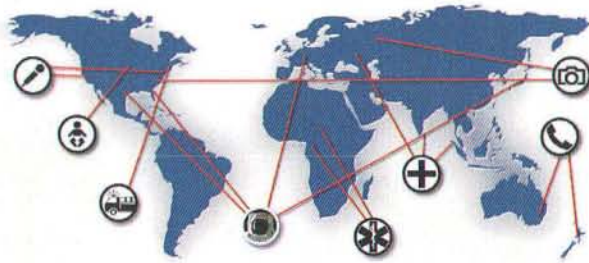
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By default, the three special characters, **space**, **tab**, and **newline** are used. Using the Adobe Acrobat 8 example, it now should be somewhat clearer as to why each is treated as a separate word. `bash` reads each space in the name as a field separator. With the default value for IFS, command substitution treats each space as a delimiter. This can be changed. At the top of each shell script, set the IFS variable. **Any character** can be the field separator, from a semi-colon, space, to a comma. The Macenterprise list came up with the following solution for the problem when a directory listing contains spaces:

```
IFS="\n"
```

The author inserted this line at the beginning of the shell script. Now that the IFS separator has been reset, spaces are no longer recognized as valid field separators. The problem is now gone, and the variable is correctly assigned. It is also useful to note that resetting IFS can be used to ensure that the IFS variable has not been improperly set before any shell script is run. As a security precaution when writing a shell script, just as the `PATH` variable is set, make it a habit to also set the IFS variable. If input is being read in, or parsed, any spoofing or accidental resetting of this variable becomes a non-issue.

USING FIND

Let's return to the original `list` command that the article opened with. The original question wanted to take a list of directories and then change their permissions. Jeff McCune from The Ohio State University suggested another method on the list. He used the shell `find` utility to accomplish the same thing in a more efficient and unix-y way. Let's start with the command in its full form:

```
find /Applications -type d -maxdepth 1 -mindepth 1 -print0 |  
xargs -0 chmod 750
```

O.K., that's a bit much! As the `find` utility may be new to some, let's break it down into its components. The second argument, `/Applications`, can be any directory that `find` will operate on. In this case, it is looking in the Applications directory. The next argument, `-type`, looks for directories, as specified by the option `d`. After that, the next two arguments instruct the `find` command not to descend into any of the Application packages. It is accomplished with the `maxdepth` and `mindepth` switches. The next option is where the real magic begins. The option, `print0`, prints the result to standard output, terminating the output with the ASCII NUL character. It will become clear why this option is important in a second. All the results from the command are printed without a terminating newline. Try just the first part of the command before the pipe character, both with `-print` and `-print0`. Note the difference, as it is critical to this commands proper function.

Now that the `find` results are complete, it is time to process them using `xargs`. `xargs` takes an argument list, and processes the results with any other command line utility. Remember the use of `print0`. As the NUL character terminates the output, `xargs` must use the `-0` flag. Without it, `xargs` does not know how to interpret

the results from the find command. This technique is also generally considered faster by Unix gurus, as it only executes the chmod command once, which may not be the case for a shell loop, or by using the **-exec** switch with the find utility.

As you can see, the problem presented on the list is not as straightforward as one might expect. As always, there is more than one way to solve the problem, but with a full understanding of the problem's intricacies, it should now be trivial to solve. Until next month, see you on the lists!

MI

About The Author

Philip Rinehart is co-chair of the steering committee leading the Mac OS X Enterprise Project (macenterprise.org) and is the Lead Mac Analyst at Yale University. He has been using Macintosh Computers since the days of the Macintosh SE, and Mac OS X since its Developer Preview Release. Before coming to Yale, he worked as a Unix system administrator for a dot-com company. He can be reached at: philip.rinehart@yale.edu.

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My Sojourn Through Cocoa BootCamp

Or What It's Like Getting Back Into The Trenches...

By Kok-Yong Tan

Why? When You Could Bootstrap Yourself...

This past March, I decided to put aside my pride (programmers, even ex-programmers, can do their own bootstrapping, right? Well, not this creaky, old fart; not any more anyway...) and just take the Cocoa BootCamp course taught by the Big Nerd Ranch at their Atlanta location. For those of you who have not heard of them, the Big Nerd Ranch, founded by Aaron Hillegass, currently runs developer training courses at two locations: A converted farmhouse outside Atlanta, Georgia and a converted monastery in Frankfurt, Germany. Since the curriculum is quite plainly laid out in the Big Nerd Ranch's website, <http://www.bignerdranch.com>, I will refrain from repeating what is already on it since we can all RTFM quite well and offer in this article my personal impressions of the course as a whole including the non-technical aspects of it. That said, let us proceed to something completely different...

The Flight From Hell and Other Musings...

As the plane descended into Atlanta's Hartsfield Airport, I was wondering if signing up for the Big Nerd Ranch's Cocoa BootCamp was such a great idea. So far, it had been a royal disaster just getting to Atlanta (my original flight was cancelled due to mechanical problems and the airline did not bother telling me despite having my cellphone number until I'd wasted one and a half hours waiting in line to rebook my flight and was number one in the queue; plus it looked like I was going to miss my shuttle out to the site and have to spend three hours cooling my heels at Hartsfield Airport until the next one. Bummer.) I figured that the Cocoa BootCamp would be populated with young Turks and here I was, a creaky geriatric-soon-to-be who had not programmed anything more complicated than simple Bash scripts under ten lines in the last fifteen years. Yes, I used

to be a C++ programmer on SunOS (just before it got rebranded as Solaris) who could hold his own in the trenches but that was a decade and a half ago. Things that I had learned and had to build from the ground up were outdated and already known as Standard Libraries, respectively. And very little of my prior knowledge and experience was transferable to Objective-C, the lingua franca of Cocoa. Or so I thought...

Hmmm...Maybe Not So Bad After All

The first pleasant surprise was that I had not missed my shuttle. Emily Herman of the Big Nerd Ranch graciously delayed the departure slightly even though the airline took their own sweet time to deliver my luggage to the carousel (Note to self: Never, ever, fly that airline again on pain of self-defenestration!). I met my first group of classmates in that shuttle and they were an interesting bunch: A professional Swing dance instructor who had a Computer Science degree but was only now beginning to use it professionally; a British ex-cop with a Ph.D. in physics whose specialty was in cavitation physics (something I had only heard about after reading Tom Clancy's "The Hunt for Red October") but was now working for a major international consulting firm as a member of their Tiger team (penetration specialists); and another physicist who worked for a major chemical company in their labs. Meeting them certainly changed my initial cynical expectations: None of them was the gunslinger type of programmer/hacker that I'd met earlier in my career – the type who forever was out to challenge others just to prove their geek supremacy. The hour's drive south-west of Atlanta, out to the Serenbe Southern Country Inn, where the course was to be held, proved to be a great way to get to know one's classmates-to-be. I was later told that the Big Nerd Ranch had moved their

training site to the Serenbe Southern Country Inn because their last site had suffered a catastrophic fire and had burned down.

The Lay of the Land

Serenbe Southern Country Inn was the next pleasant surprise. It was a converted and spread out farm with many of the outlying buildings turned into cottage-like dwellings but relatively updated under the hood with central air-conditioning, excellent conference facilities and what was looking to be a highly skilled kitchen staff from the boxed lunch provided on the first day (something that would be of great interest to me). Even though I had asked for accommodations in the main building (after having had my fill of the great outdoors from a previous stint in the ground pounding branch of the military), it was not as bad as I had envisioned. No untamed flora or fauna nor their unwelcome deposits to deal with—I am a city boy after all! The furnishings and peaceful quiet reminded me of a completely different era where nobody rushed anywhere. And settling in for a nap before dinner on the covered porch outside my assigned room with a glass of sweet Southern iced tea within easy reach almost resulted in my missing the first dinner with the entire class—it was THAT relaxing!

At dinner, I met the rest of the class. While there were the requisite number of programmers (a.k.a. “the usual suspects”), the more exotic enrollees were an ex-Apple high level executive who wanted to return to a more contributory role in development where the codebase was concerned; a retired Cray hardware engineer who wanted to explore software; and a programmer for a radio astronomy observatory. The cast of characters was getting more interesting by the minute...

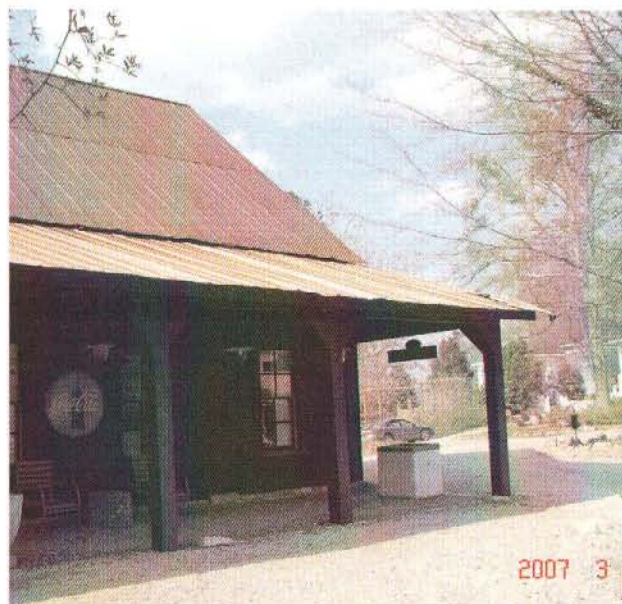


Figure 1 - The reception and administration building in the left foreground and the restaurant in the right background.



Figure 2 - One of the residential cottages at Serenbe Inn.

Expectations Along With Our Daily Bread

Classes began every day in a conference room on the edge of a verdant field at 9:00 a.m. after delicious breakfasts; ran up till a break for healthy lunches at 12:30 p.m.; resumed at 1:00 p.m. until 6:00 p.m.; followed by sumptuous dinners. I certainly had nothing to complain about gastronomically and I am very picky about my food. In between lunch and dinner, Aaron would take everybody interested in an hour-long “nature walk” (shudder) to “clear the mind” while the rest could do as they pleased for the duration that the adventurous were romping through the great outdoors. The course resumed when they returned and continued until dinnertime. As was advertised, Aaron would stay around the conference room after dinner until about 10:00 p.m. to work with those students who had questions about their own, non-course-related projects. And he gave unstintingly of his time. A pity that I just did not have my magnum opus with me nor even a clue of what it would be at that stage of the game. However, if one does get inspiration within the next three months, one could still ask the questions of the Big Nerd Ranch. Failing that, all alumni have access to the alumni mailing list, which continues to be pretty active along with archives of past emails that can be easily downloaded.

Into the Lion's Den

As I attended the first day of classes, I waited for the other shoe to drop. Surely, it could not be this pleasant (remember: I live in New York City and have absorbed the cynicism native to the region)? But yes, it could. Aaron Hillegass taught the class himself and we could not have had a better and more patient instructor. There were times I asked questions that even I cringed inwardly at after the words had left my mouth but he patiently answered every one, even if only to say that the question would be more clearly and apparently answered later.

We basically used his book, "Cocoa Programming for Mac OS X, 2nd Edition," as the text and he provided another bound volume with extra chapters that took into account the since-updated Cocoa libraries (it should be noted that he tries to keep everybody as up to date as possible, given the constantly improving versions of the Cocoa platform that Apple publishes). It was no "talking head" course. It was a totally "hands on, fingers on the keyboard or mouse" course. Naturally, it helped if you were a good typist! After finishing the basic requirements for each segment, students were free to try to expand on the code and tweak it in any way they saw fit, with some guidelines for those who were imagination-deficient (such as myself. It could have been the yummy cookies along with the fresh lemonade and sweet Southern iced tea they served daily in the afternoons that distracted me but I think it was just me).

Support Services

Accommodations were more than comfortable. The central air-conditioning certainly did help, as the afternoons could be muggy, even in the March week that I was there. My room was furnished in a way that reminded me of a guest room in someone's home rather than the cookie-cutter furnishing style that you would find in a chain hotel. Despite the rather dispersed layout and seemingly rustic decor of Serenbe Inn that was reminiscent of a Depression-era dwelling, creature comforts were not neglected underneath the hood.

For those of us who did not bring our own laptops and who had advised the Big Nerd Ranch prior to our arrival, iMacs were provided and there was a T1-level data line that allowed those of us anxious about being away from the office for the week to get our daily email "fixes" via wireless router. For those of us who were limited by the lack of coverage by our cellular telephone providers, this was a necessary lifeline (for instance, I could only get a weak signal while standing in the field outside the conference room—no fun when the weather was less than ideal—although others could get strong signals anywhere on the property).

The cuisine was well-executed with a Southern slant. Even the vegetarians amongst us did not find themselves left out (at least from the perspective of an affirmed carnivore such as I). From the hearty breakfasts (which varied every day—who knew breakfasts could be so enjoyably different in

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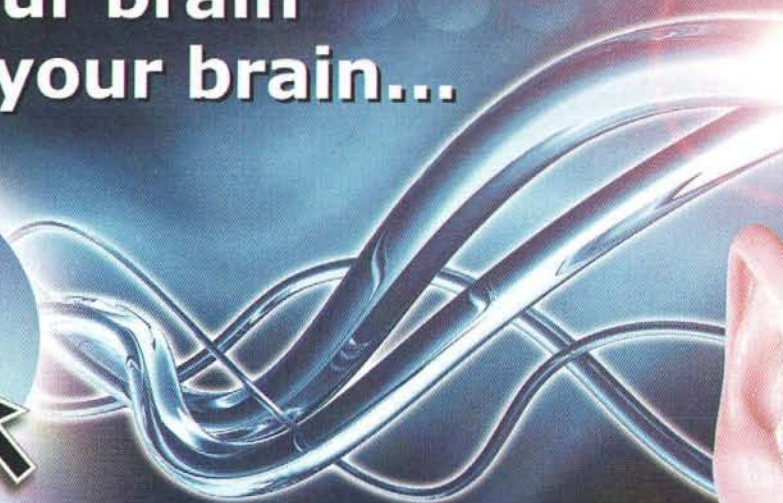
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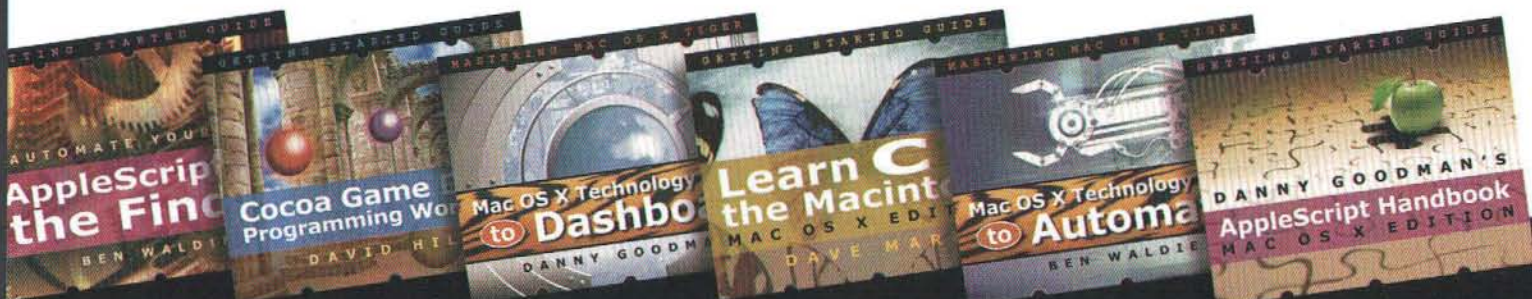


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a mere week's stay? I even discovered I liked that oft-heard about Southern food: grits) to the lunches and dinners of fried chicken, catfish, etc., and the snacks in between, it was like staying with friends who just happened to have chefs and master programming instructors around so both our minds and bellies were equally well-sated.

La Raison d'être

After attending the Cocoa BootCamp course, what I found intriguing about the language was that unlike a strongly-typed language like C++ where the compiler caught the little things like typographical errors in programs (basically doing the nit-picky grunt work for the programmer), the compiler for the dynamically-typed Objective-C language let such things through with mere warnings instead of outright errors. While this made sense for a dynamically-typed language, it taught me that inattention to such details was likely to result in a coredump in code that seemed to compile and produce an executable. This was so different from C++ where the process would either fail at either the compile or link stage and not producing an executable at all. Moreover, the warnings could be extremely cryptic (it would not be something obvious like "No such variable" as I was accustomed to with C++). Also, after a fifteen-year hiatus from programming, I found Aaron's teaching style made re-learning old skills and introduction to new ones quite an easy transition to make. Furthermore, with Apple's Integrated Development Environment (IDE) comprised of Xcode, Interface Builder and other tools, it made rapid prototyping very easy.

Gone are the days when just trying to get a single window and a couple of buttons to show up in X windows required massive amounts of coding. With Interface Builder, it's child's play to create the window(s) you want, complete with little blue guide markers that allow programmers to follow Apple's Human Interface Guidelines with no effort whatsoever and then just link the actions for each button or field to the code in Xcode. It even put little prompts such as "Insert your code here" in the source code files, for heaven's sake! Programmers have to make a conscious effort to deviate from the recommended formats (although it is still possible for you ultimate rebels out there) so I give Apple great kudos for subtly changing "Build it insanely great and they will come" to "Make it easy, throw in the 'insanely great' part as a by-product and they will come"!

Although it was primarily a Cocoa course and not an Xcode nor Interface Builder course (both of which deserve mini-courses unto themselves), Aaron took pains to show us some of the various options available in the IDE. Yes, it would be possible to just read Aaron's book (and some of us did that prior to arriving) but sometimes, you need to be able to ask the author why he did something a particular way (and, like Shakespeare said, "There is method to the madness.")

On the other hand, while Apple's tools made Aaron's job much easier, the course is really structured for those with at least a passing familiarity with object-oriented coding concepts and also some prior experience in coding. In other words, the course would be best appreciated by "coding switchers," to purloin a phrase from Apple's advertising campaign. In my experience, I believe it would be a stretch for someone with absolutely no coding experience whatsoever to gain the optimal benefit from this course. Due to the rather extensive amount of information that has to be covered in the four and a half days of the course (we started on Monday morning, finished by noon on Friday and left by 1 p.m.), Aaron had to move along quite rapidly. For those with zero or little coding experience, it might be a better bet to take the Objective-C/Cocoa BootCamp combination courses that the Big Nerd Ranch offers as it is highly likely that the student would find himself/herself so far up a certain type of creek that even a paddle would be insufficient to get themselves out if they were just to take the Cocoa BootCamp course without sufficient background.

Life's A Box of Chocolates...

You are no doubt wondering what the bottom line is after that long rambling discourse that resembles someone with acute ADHD who missed his daily dose of Ritalin (or Yoda in full combat mode, take your pick) so here it is: I heartily and highly recommend the Big Nerd Ranch's Cocoa BootCamp if you have the necessary experience behind you because it will bootstrap you via the fastest means possible, feed and house you so well that you would swear you were on a luxury vacation and, last but not least, if you are taught by Aaron himself, you will feel guilty about having gotten the better part of the deal. To quote someone short and green (no, not Kermit), "Do or do not. There is no 'try'."

M

About The Author



Kok-Yong Tan hails from Singapore but has spent the last 23 years living in New York City. After graduating with a Computer Science degree from Columbia University and initially working for Merrill Lynch as a programmer in its Fixed Income Analytics Group, he now runs his own consulting firm, Reality Artisans, Inc. He likes the city because there are already so many other weirdos

that nobody seems to notice his "costume" of solar-powered pith helmet and heavily-laden photojournalists' vest. He ended up in systems and network administration because he was ordered by his ex-boss at Merrill Lynch into the abyssal pit as part of the "team player" creed and he has yet to find his way back out. He is now contemplating clawing his way back into programming as a means of avoiding the PEBKAC crowd.

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Brian Webster,

Fat Cat Software

<http://www.fatcatsoftware.com>



What do you do?

As the owner and sole proprietor of Fat Cat Software, I write Cocoa applications for OS X. My two products for sale are iPhoto Library Manager, which lets you shuffle photos among multiple iPhoto libraries, and PlistEdit Pro, an advanced property list editor for developers and power users. I've mainly come at the business from the programming perspective, but of course, I handle all the other various things that need to be done as well (website, marketing, etc.)

How long have you been doing what you do?

I first started programming for the Mac back in high school. I took a programming class they had there, then my brother lent me his copy of Macintosh Revealed, and I was hooked. I started programming using the Mac Toolbox and Think Pascal, then eventually worked my way up to C and C++ with CodeWarrior, and so forth. I picked up on Cocoa as soon as the Apple-NeXT merger happened, and started doing Cocoa programming professionally in 2002. I decided to venture off on my own in the fall of 2006 and have been coding away ever since.

Your first computer:

We first got a Mac Plus back in 1987, when I was about 9 years old. It was purportedly to be used for schoolwork, but ended up spending most of its time running Dark Castle and Wizardry.

Are you Mac-only, or a multi-platform person?

I've been Mac only pretty much my whole life. I didn't even really know what PCs were until late high school. I have also learned a fair bit of UNIX, first in college then of course using Mac OS X, so I can be fairly comfortable there as well.

What attracts you to working on the Mac?

The frameworks are definitely what makes programming on the Mac attractive, with the Cocoa framework leading the way. OpenStep, then Cocoa, was built with a primary goal of trying to minimize the amount of code the programmer has to write, so they can get right down to implementing the meat of their program without having to fiddle around writing boilerplate code over and over again. With each iteration, Apple seems to add a whole new layer to the framework that lets you actually delete code from your program, which is surprisingly satisfying. They were also designed from day one to work with tools like Interface Builder, which makes for a much more well-integrated GUI builder than most other similar tools out there.

What's the coolest thing about the Mac?

The "it just works" factor. Computers can often be enigmatic and frustrating, but the Mac platform sets the bar higher for user experience. On other platforms such as Windows, programs often seem to be written under the theory that as long as the functionality exists somewhere in the program, then it can be called "done", and you can check that checkbox off of the list.

When you're working all day on a Mac, you get used to using programs that have good interfaces and ideas, and doing so affects your own application development. You can have something working OK, but still have it not "feel right", because you haven't gotten it to the same level where the apps you use every day are. If you used Windows every day, those kind of details might not catch your eye nearly as easily.

If I could change one thing about Apple/OS X, I'd:

Ease back on the whole super-double-top-secret attitude, especially when it comes to developers. I appreciate that Apple is usually developing some very cool new stuff and doesn't want to have their ideas stolen. However, when it gets to the point where developers can't get basic, straightforward answers about Apple's plans for the future, I think that does them harm, both in terms of giving developers the information they need to make the best Mac apps they can, and also just maintaining developers' goodwill.

What's the coolest tech thing you've done using OS X?

It's not exactly whiz-bang, but I'm pretty proud of the underlying Apple event handling code in iPhoto Library Manager that lets it do complex operations with iPhoto while maintaining a good level of performance.

Where can we see a sample of your work?

All my work can pretty much be found at my website, <http://www.fatcatsoftware.com>

The next way I'm going to impact IT/OS X/the Mac universe is:

My next project will be a similar product to iPhoto Library Manager, but for iTunes instead of iPhoto. This has been my number one customer request, so I figure I should give the people what they want. :-). Its feature set will be different, though, since the needs of iTunes users are different in many ways from those of iPhoto.

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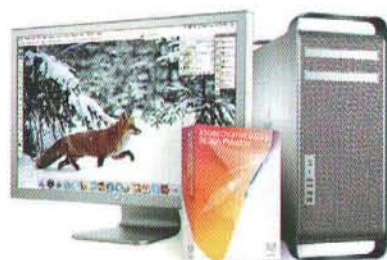
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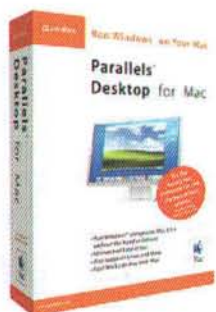
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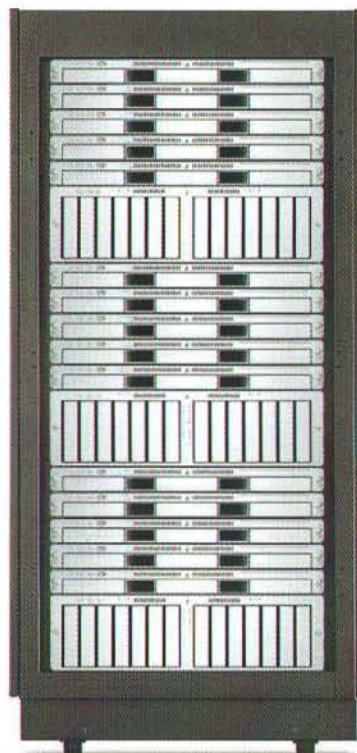


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